



Apple® II System Disk

User's Guide

Apple II System Utilities
Version 3.1

Main Menu
ESC: Quit

Work on Entire Disks	Work on Individual Files
Catalog a Disk	Copy Files
List Volumes	Delete Files
Duplicate a Disk	Rename Files
Format a Disk	Lock/Unlock Files
Verify a Disk	

Work on ProDOS Disks Only	Other Options
Create Subdirectory	Set Serial Ports
Set Prefix	About the System Utilities
Rename Volumes	Quit

Press ↓ ↑ ← → to select an option.
Then press RETURN.

For Help: Press ⌘?

For the 128K Apple IIe, IIc and IIc Plus

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This equipment has been certified to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC rules. Only peripheral devices (computer input/output devices, terminals, printers, and so on) certified to comply with Class B limits may be attached to this computer.

Operation with noncertified peripheral devices is likely to result in interference to radio and television reception.



Apple® II System Disk

User's Guide





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Radio and television interference

The equipment described in this manual generates and uses radio-frequency energy. If it is not installed and used properly—that is, in strict accordance with our instructions—it may cause interference with radio and television reception.

This equipment has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that the interference will not occur in a particular installation, especially if a "rabbit-ear" television antenna is used. (A rabbit-ear antenna is the telescoping-rod type usually found on television receivers.)

You can determine whether your computer is causing interference by turning it off. If the interference stops, it was probably caused by the computer or its peripheral devices. To further isolate the problem, disconnect the peripheral devices and their input/output (I/O) cables one at a time. If the interference stops, it was caused by either the peripheral device or the I/O cable. These devices require shielded I/O cables. For Apple peripheral devices, you can obtain the proper **shielded cable** from your authorized Apple dealer. For non-Apple peripheral devices, contact the manufacturer or dealer for assistance.

A **shielded cable** has a metallic wrap around the wires to reduce the potential effects of radio-frequency interference.

If your computer does cause interference to radio or television reception, you can try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the computer to one side or the other of the television or radio.
- Move the computer farther away from the television or radio.
- Plug the computer into an outlet that is on a different circuit than the television or radio. (That is, make certain the computer and the radio or television set are on circuits controlled by different circuit breakers or fuses.)
- Consider installing a rooftop television antenna with a coaxial cable lead-in between the antenna and television set.

If necessary, consult your authorized Apple dealer or an experienced radio/television technician for additional suggestions.



Important

This product was FCC-certified under test conditions that included use of shielded cables and connectors between system components. It is important that you use shielded cables and connectors to reduce the possibility of causing interference to radio, television, and other electronic devices. △

How to get the most out of this guide

If you've just set up
your computer ...

read your Apple® II owner's guide for general information about applications, documents, and disks.

If you're new
to computers ...

read through Chapter 1, "About the System Disk," and Chapter 2, "An Introduction to Utilities," which includes a hands-on tutorial for first-time users.

If you're experienced ...

read Chapter 1, "About the System Disk," and then skip to Chapters 3 through 6, which give detailed procedures for every option.

If you need to set
serial ports on the
Apple IIC or
Apple IIC Plus ...

read Chapter 7, "Setting the Printer and Modem Ports on the Apple IIC and Apple IIC Plus."

If you have a memory
expansion card ...

read Chapter 8, "Working With a Memory Expansion Card."

If you wonder what
a word (especially
a word in **boldface**)
means ...

look it up in the glossary at the back of the book.

If you want to
look up a topic ...

scan the table of contents or flip to the index.

If you think
you're in trouble ...

jump to Chapter 9, "Troubleshooting."

About the System Disk

THE *APPLE® II SYSTEM DISK* IS AN INDISPENSABLE PART OF YOUR COMPUTER system. It has a variety of utility programs for copying disks, checking to see what files are on a disk, copying files, deleting files, renaming files, and much more. It also gives you a way of entering the Applesoft BASIC programming environment so you can write your own programs and save them to disks.

The system disk and this guide are for use with the Apple IIc, the Apple IIc Plus, and the Apple IIe. This guide assumes that you are already familiar with the material in your Apple II owner's guide. If terms such as *disk*, *application*, *document*, and *file* are new to you, please review your Apple II owner's guide before using the system disk.

What's on the system disk

The System Disk menu gives you four choices:

- System Utilities
- FastCopy
- exit to BASIC
- quit to another program

System Utilities

The utilities allow you to prepare blank disks for storing documents, copy documents from one disk to another, list the contents of disks, and perform many similar housekeeping chores related to the information stored on disks.

The utilities are discussed in Chapters 2 through 8.

FastCopy

FastCopy is a no-frills copy program. It allows you to duplicate an entire disk quickly and to compare the copy to the original to verify that the copying procedure was successful.

You'll learn to use this program later in this chapter by making a copy of your system disk.

Exit to BASIC

The BASIC option is for programmers. It allows you to save BASIC programs to disks and load BASIC programs from disks. The Applesoft BASIC programming language is built into your Apple II computer, but ProDOS® operating system support is not. Choosing the BASIC option on the System Disk menu allows you to use ProDOS-formatted disks in the Applesoft programming environment.

This guide does not teach you to program in BASIC. For an introduction to programming in BASIC, see *A Touch of Applesoft BASIC*.

Quit to another program

The **Command** key is the key that has the Apple and propeller symbols on it.

The fourth option on the System Disk menu is quitting. When you choose this option, you are asked to confirm that you really want to quit. If you do, press Right Arrow to select Yes, and then press the Return key.

If you're through for the day, remove the disk and turn off the power. If you want to restart the system disk or switch to another application, there are two ways to go: the easy way and the not-so-easy way.

The easy way: Make sure the disk drive in-use light is off. Put the application disk in your startup drive and press Command-Control-Reset.

❖ *By the way:* When you are asked in this manual to press two or more keys whose names are joined by hyphens, you should press the keys simultaneously and then release them. When the key combination is Command-Control-Reset, release Reset *before* the other keys.

The not-so-easy way:

1. Put the disk you want to use next in the startup drive.
2. When you are asked if you really want to run another program, select Yes and press Return.
3. When you are asked to enter the prefix, type the name of the disk and press Return.
4. When you are asked to enter the pathname, type the name of the system file (it's usually the file whose name ends with .SYSTEM) and press Return.

Using the system disk

Follow these instructions to begin using the system disk:

1. Start up the system disk. You see the System Disk menu shown in Figure 1-1.



Figure 1-1
The System Disk menu

2. Press the Up Arrow key or the Down Arrow key to highlight the option you want, then press Return.

Using FastCopy

Before you go any further, it's a good idea to make a working copy of your *Apple II System Disk*. Once you've copied the disk, put the original in a safe place so that you'll be able to copy it again if something should happen to your working copy.

In the System Disk menu, press Up Arrow or Down Arrow until FastCopy is highlighted, then press Return. After a few seconds, you see the title screen and then the FastCopy menu. (See Figure 1-2.)

- ❖ *RAM disk users:* Before the FastCopy menu appears, you will be asked whether it's OK for FastCopy to erase the contents of your RAM disk. If you don't mind losing what's stored on your RAM disk, press Right Arrow to highlight Yes, then press Return. If you don't want to lose the information on your RAM disk, press Return; FastCopy will use only the unused portion of your RAM disk.

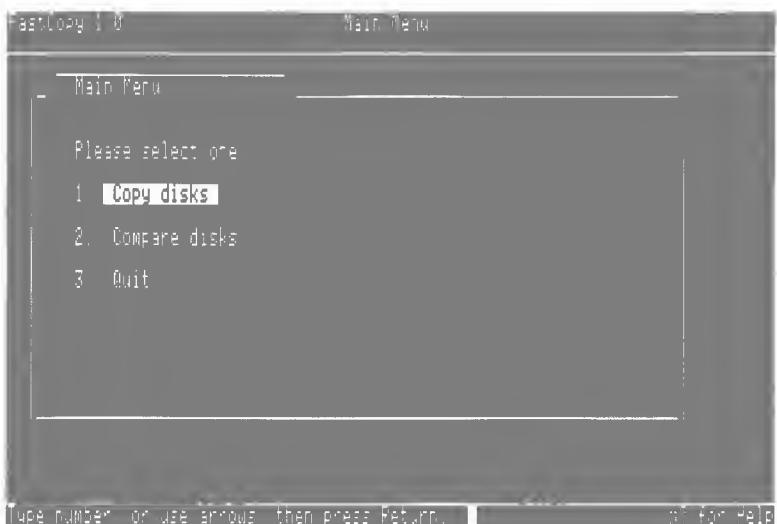


Figure 1-2
The FastCopy menu

Copying disks

To **write-protect** a 3.5-inch disk, slide the tab to uncover the square opening in the corner of the disk. To write-protect a 5.25-inch disk, cover the notch on the side of the disk with an adhesive write-protect label that came with the disk, or use ordinary masking tape.

1. Press Return to select Copy Disks.
 - ❖ *Need help?* Instructions in the lower-left corner of the screen tell you what to do next. For additional information, hold down Command and press the question mark key.
2. If asked, select the type of drive you want to use for the copying procedure. Highlight the option you want by pressing the Left Arrow key or the Right Arrow key, then press Return.
 - If you select 3.5, the program ejects any 3.5-inch disks in the 3.5-inch drives connected to your system so that you can insert the disks you want to copy from and to.
 - If you select 5.25, you are asked whether you have one or two 5.25-inch drives. Highlight the option you want by pressing Left Arrow or Right Arrow, then press Return. (Once you've answered this question, the program remembers your response and doesn't ask again until you restart the system disk.)
3. A message appears at the bottom of the screen asking you to insert your **source** disk—the disk you want to copy. **Write-protect** the system disk, insert it in your disk drive, and, if it's a 5.25-inch disk, press Return. (With 5.25-inch disks, you must put the source disk in your startup drive. With 3.5-inch disks, you can put the source disk in any 3.5-inch drive.)
4. If you are using two drives for the copying procedure, a message at the bottom of the screen tells you to insert your **destination** disk. Insert a blank disk or a disk you don't mind erasing; if it's a 5.25-inch disk, press Return.
5. If the disk is blank, you see a message asking whether you want to format the disk. Press Right Arrow to highlight Yes, then press Return. If the disk has information on it, you are asked if it's okay to destroy that data.

6. If you are using one drive, swap the source disk for the destination disk when prompted by messages on the screen.
 - ❖ *How it works:* FastCopy **reads** as much information from the source disk as it can fit in memory. As it is reading information from the disk, you see a message indicating what percentage of the source disk has been read. When FastCopy has read as much information as your computer's memory can handle, it **writes** the information to the destination disk. As the program is writing information to the destination disk, you see a message indicating what percentage of the information has been written to the destination disk. If you have two drives of the same type, the reading and writing proceed without any intervention on your part. If you have only one drive, watch for messages at the bottom of the screen telling you to swap the source disk for the destination disk.
7. When FastCopy has finished writing all information to the destination disk, you see the message "Copy complete." Press Return to go back to the FastCopy menu.
 - ❖ *Multiple copies:* Depending on the amount of data on the source disk and the amount of memory available in your system, all the data to be copied may fit in memory at once. In this case, after making one copy, the program gives you the option of making additional copies without rereading the source. This option is convenient if you need to make several copies of the same disk. It's especially convenient with a one-drive system because it allows you to make additional copies without reinserting the source disk.

Comparing disks

Comparing disks is a good way to verify that a backup disk matches the source. Use the Compare Disks option now to check your copy of the system disk against the source.

1. From the FastCopy menu, press Up Arrow or Down Arrow to highlight Compare Disks, then press Return.
2. Select the drive type.
3. If asked, select the number of drives. Press Left Arrow or Right Arrow to highlight the option you want.
 - ❖ *Comparing after copying:* If you've just used the Copy Disks option, you may see a message saying that the source disk is still in memory. If that is the case, you can skip to step 5 by pressing Return.
4. Write-protect and insert the original system disk.

You see a message indicating what percentage of the source disk has been read.
5. Insert the copy of the system disk when the message at the bottom of the screen tells you to insert the destination disk.

You see a message indicating what percentage of the destination disk has been compared.
6. If you're using a one-drive system, swap the source disk for the destination disk when prompted by messages on the screen.
7. When the disk comparison is complete, you see the message "Disks match" or "Disks don't match." If your disks match, put the original system disk in a safe place and use the copy as your working system disk. If the disks don't match, try copying the disk again.
8. Press Return to go back to the FastCopy menu.
9. Press Up Arrow or Down Arrow to highlight Quit. Then press Return.

You are asked to confirm that you want to quit. If you do, press Right Arrow to highlight Yes and press Return. You return to the System Disk menu.

About System Utilities

File is a generic term for a document, a program, or a subdirectory—anything that you save by name on a disk.

The rest of this book explains how to use the utilities on the system disk. Before you turn to Chapter 2 for a hands-on introduction to the utilities or put the book aside to master the utilities on your own, you need to know how to specify the location of the disk or **file** you want to copy, delete, rename, or otherwise manipulate.

There are two ways to specify the location of a disk or file: by slot and drive number or by ProDOS pathname.

- ❖ *In general:* Use the slot-and-drive method when you know the location of a disk but don't know its name. Use the ProDOS pathname method if you need to work with files in subdirectories, or if you know the disk name but don't know which drive the disk is in.

Slot and drive

If you have an Apple IIe, the meaning of *slot* is literal. There are actual slots inside your computer, and your disk drive's controller card is connected to one of them. By convention, 3.5-inch drives are connected to a card in slot 5 and 5.25-inch drives are connected to a card in slot 6. If you have more than one drive in a slot, the drive connected directly to the card is drive 1; the drive connected to drive 1 is drive 2.

- ❖ *More than two devices in slot 5:* Only two devices can be identified with each slot, so if you connect more than two devices to slot 5, the third and fourth 3.5-inch drives behave as if they are connected to a card in slot 2. Think of slot 2 as the overflow slot for actual devices connected to slot 5.

If you have an Apple IIc Plus or an Apple IIc, you don't have slots with interface cards, but your computer's ports were designed to imitate slots. As a result, the same applications work on all models of the Apple II. Here's what you need to remember: a 3.5-inch drive connected to the disk drive port behaves as if it is connected to a card in slot 5. A 5.25-inch drive connected to the disk drive port behaves as if it is connected to a card in slot 6. A memory expansion card behaves as if it is connected to a card in slot 4. See Table 1-1 for a list of slot equivalents for disk drives connected to an Apple IIc Plus or an Apple IIc.

Table 1-1
Disk drive slot assignments

Disk drive	Slot	Drive
First 5.25	6	1
Second 5.25	6	2
First 3.5	5	1
Second 3.5	5	2
Third 3.5	2	1
Fourth 3.5	2	2
Memory expansion card (RAM disk)	4	1

- ❖ *Note:* On an Apple IIc, the built-in drive is the first 5.25-inch drive (slot 6, drive 1). On an Apple IIc Plus, the built-in drive is the first 3.5-inch drive (slot 5, drive 1).

ProDOS pathname

A **subcategory** is to a disk what a file folder is to a file drawer. Subdirectories give you a way to organize your documents so they are easy to find.

Another way of specifying the location of a disk or file is by its pathname. A pathname provides a trail of names leading the computer first to a disk, then to a **subcategory**, if any, on that disk, and eventually to a file in that subdirectory. A pathname begins with a slash, and every part of the pathname is separated by a slash. For example, the pathname for a file called PELE in a subdirectory called SOCCER on a disk called SPORTS would look like this: /SPORTS/SOCCER/PELE.

If you don't already know about subdirectories, use the slot-and-drive method for specifying the location of disks and files. (You'll learn how to create subdirectories in Chapter 2.) Once you start using subdirectories, you'll need to use the ProDOS pathname method to specify the subdirectory containing the files you want to work on.

Now what?

At this point you can proceed to Chapter 2 for a hands-on introduction to the utilities, you can explore the utilities on your own, or you can take a break.

If you decide to explore the utilities on your own and find that you need help, turn to Chapters 4, 5, and 6 for reference. Topics in those chapters are arranged in their order of appearance on the System Utilities Main Menu and include step-by-step directions.

An Introduction to Utilities

AS THE NAME IMPLIES, THE UTILITIES ARE USEFUL PROGRAMS. IN THIS CHAPTER you'll see how they can come in handy, and you'll get a step-by-step introduction to some of their most common uses.

The idea of utilities

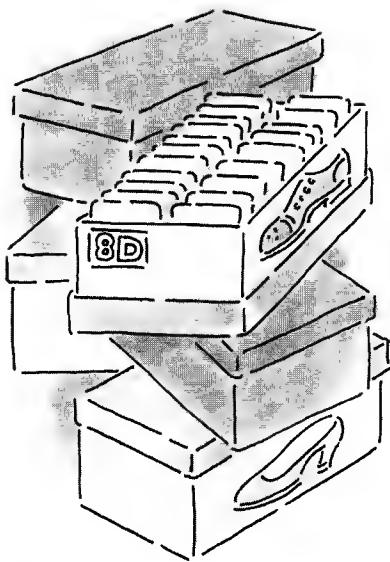


Figure 2-1
Boxes of disks

As you use your computer, you save a lot of information on disks. Before you know it, you could have shoe boxes full of disks and no idea where to find the information you want.

You need some way to organize the information on those disks—a way to find out what's on a particular disk, a way to delete documents, a way to protect crucial documents from accidental erasure. You can do all these things and more with the **utilities** on the *Apple II System Disk*.

The utilities are a little different from other applications. You don't use the utilities to create a document; you use them to rearrange documents created with other applications.

- ❖ *By the way:* In the utilities, you will see the term *volume* where you might expect to see the word *disk*. A volume is a storage area for data. When you're working with 5.25-inch and 3.5-inch disks, you have only one volume per disk, so the terms are synonymous—the disk name is the volume name. With larger storage devices there can be many volumes on one disk; that's why the utilities sometimes make a distinction between disks and volumes.

What follows is a brief outline of the ways the utilities can help you manage disks and documents.

Working with disks

When you're working with disks, you can use the utilities to

- show you what documents and applications are on a particular disk (known in the utilities as *cataloging a disk*)
- make a copy of a whole disk (*duplicating a disk*)
- prepare a disk to store information (*formatting a disk*)
- make sure that a disk is in good shape (*verifying a disk*)
- give a formatted disk a new name without disturbing its contents (*renaming a volume*)
- tell you the names of the disks in your disk drives (*listing volumes*)

Working with files

A **file** is any body of information stored by name on a disk. A document, for instance, is a file. When preserving and organizing your files, you can use the utilities to

- make a copy of one or more files (*copying files*)
- delete files you no longer need (*deleting files*)
- give new names to existing files (*renaming files*)
- protect files from accidental changes (*locking files*)
- remove protection, allowing changes to be made to files (*unlocking files*)
- create a folder to contain a group of related files and a list of those files (*creating a subdirectory*)
- set up a shortcut to a particular disk or subdirectory, for faster access and less typing (*setting a prefix*)

Many applications perform similar services, at least when you're working with the files they helped you create. If the application you're using has some utilities built in, you won't need to use the utilities on the system disk very often. If an application does not let you format a disk, copy a file, or create a subdirectory, though, you can always turn to the system disk.

A hands-on tutorial

The best way to learn about the system disk is to use it. In this section you'll learn how to format a blank disk to receive information, create a folder to hold new files, copy a file into the folder, and then check to make sure the copy arrived.

For this tutorial, you need

- your working copy of the system disk
- a blank disk the same size as your system disk

To do this tutorial, you do not need a second disk drive, though if you have one, it will occasionally come in handy.

Formatting a disk

Before a disk can receive any files, it must be **formatted**, or divided into sections where information can be stored. The process of formatting erases any information on the disk, so you should always make sure you are using a brand-new disk or one that contains nothing of value.

1. **With your working copy of the system disk in the startup drive, turn on the computer and monitor.**

You see the System Disk menu, with the utilities highlighted. (See Figure 2-2.)



Figure 2-2
The System Disk menu

If you don't see this menu after ten or fifteen seconds, make sure your working copy is in the startup drive, then press Command-Control-Reset to start the computer again. Release Reset before releasing the other keys. If restarting doesn't work, check all your connections, make sure the monitor is plugged in and turned on, and try again. If you still don't see the menu, something may have gone wrong when you were making the copy; try copying again with a different disk.

2. In the System Disk menu, press Return to choose System Utilities.

In a few moments, you see the Main Menu of the utilities. (See Figure 2-3.)

The Set Serial Ports option only appears if you are using an Apple IIc or an Apple IIc Plus.



Figure 2-3
The Main Menu of the utilities

3. Press Down Arrow to highlight the Format a Disk option.

The arrow keys move the highlighting left and right, up and down.

4. Press Return to select the highlighted option.

A message appears asking where the disk is. The Slot and Drive option is highlighted, indicating that the computer needs you to identify the disk's location by slot and drive.

A **default** is the suggested or standard response, which the computer will use if you do not type something else.

5. To accept this method, press Return.

You see the standard (most common) slot number and drive number, shown in Figure 2-4. (These are the numbers the computer will use if you don't type anything else; such responses are sometimes known as **defaults**.)

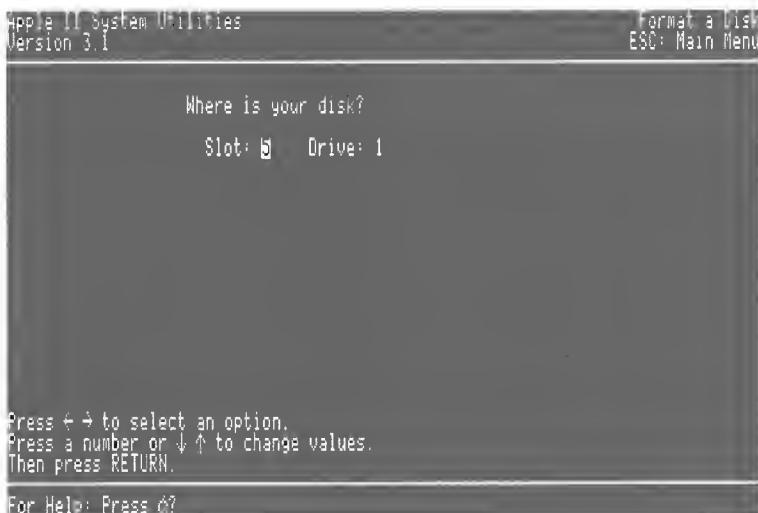


Figure 2-4
The Format a Disk screen

You will be using the startup drive to format the disk. The startup drive is slot 5, drive 1, for 3.5-inch disks, and slot 6, drive 1, for 5.25-inch disks.

6. To accept the default slot and drive, press Return. To change the slot or drive number, press Left Arrow or Right Arrow to highlight the number, then type the new number. When the information is correct, press Return.

An **operating system** is a set of programs on every application disk that manages the flow of information between disks, the computer's memory, and peripheral devices such as printers or modems.

A message appears asking which **operating system** to use in formatting the disk.

ProDOS is short for **Professional Disk Operating System**; it's the most recent operating system used with Apple II computers.

You must format disks with the same operating system your application uses, or you won't be able to save files on those disks. The utilities rely on the **ProDOS** operating system. Because you're going to copy one of the files from the utilities, you need to use ProDOS to format the disk that the file will be copied onto.

You'll learn more about choosing the correct operating system in "Choosing an Operating System" in Chapter 3.

7. To use ProDOS in formatting the disk, press Return.

Now you need to name the disk you're formatting. Once formatted, the disk is known as a *volume*; it is like a blank notebook, ready to receive data.

8. Press Control-X to delete the suggested name for your new disk, then type TRYOUT.

That's a logical name because you're trying out the utilities.

If you need to make a correction, press Left Arrow or Right Arrow to move the **cursor** under a character. To get rid of the character to the left of the cursor, use the Delete key. To insert characters to the left of the cursor, just start typing.

9. When you've typed the name just as you want it, press Return.

You're asked to place the destination disk in the startup drive. The destination disk is the one you intend to format.

10. Remove the working copy of the system disk and replace it with a blank disk. Then press Return.

This step prevents you from accidentally reformatting the system disk. If you leave the system disk in the drive, you see a message asking whether you really want to destroy the data on it. Just highlight No and press Return to save your original disk.

The utilities format your blank disk, and after a few moments you see the message "Formatting... Done!"

You've prepared this disk to receive and store data.

11. To return to the Main Menu, press Return.

Finding out what's on a disk

A **directory** lists the files on a disk, with information about each one.

Formatting a disk gives it a name and a **directory**—an empty list prepared to record the names of any files you save on the disk. The directory is sometimes known as a *catalog*. Cataloging a disk shows you the name of the disk, the operating system used to format it, and the names of any files stored on it. Now you'll catalog the disk you just formatted to make sure the formatting went well.

1. In the Main Menu, highlight Catalog a Disk and press Return.

You see a screen similar to the one shown in Figure 2-5.

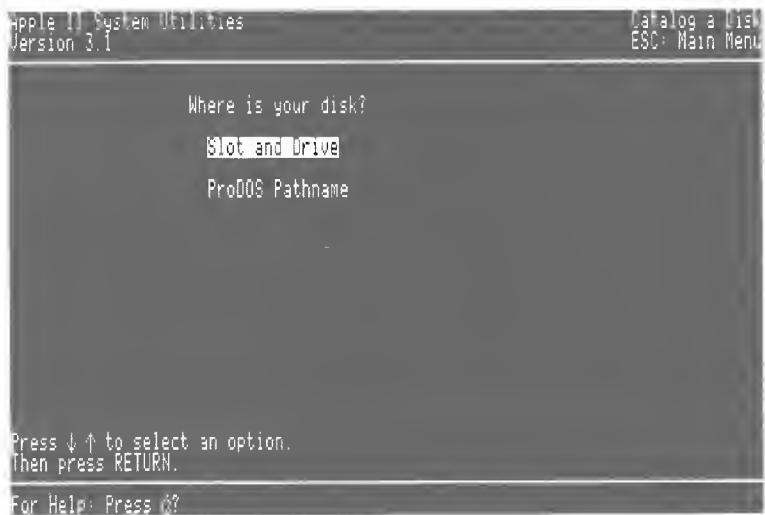


Figure 2-5
The Catalog a Disk screen

Before you can tell the computer where the disk to be cataloged will be, you must pick the method by which you will identify its location. You can identify the location physically (by slot and drive) or you can give the disk's name. For now, it's easiest to use the slot-and-drive method.

2. To choose the slot-and-drive method, press Return.

You now have a chance to change the default entries for slot and drive. (See Figure 2-6.)



Figure 2-6
Default slot and drive numbers

Make sure the message contains the correct slot and drive numbers. If the slot number is incorrect, type the correct number. If the drive number is incorrect, press Right Arrow to move the highlighting over to Drive, and then type the correct number.

3. When you have entered the slot and drive numbers for the disk you want cataloged, press Return.

The directory appears for your disk named TRYOUT. (See Figure 2-7.)

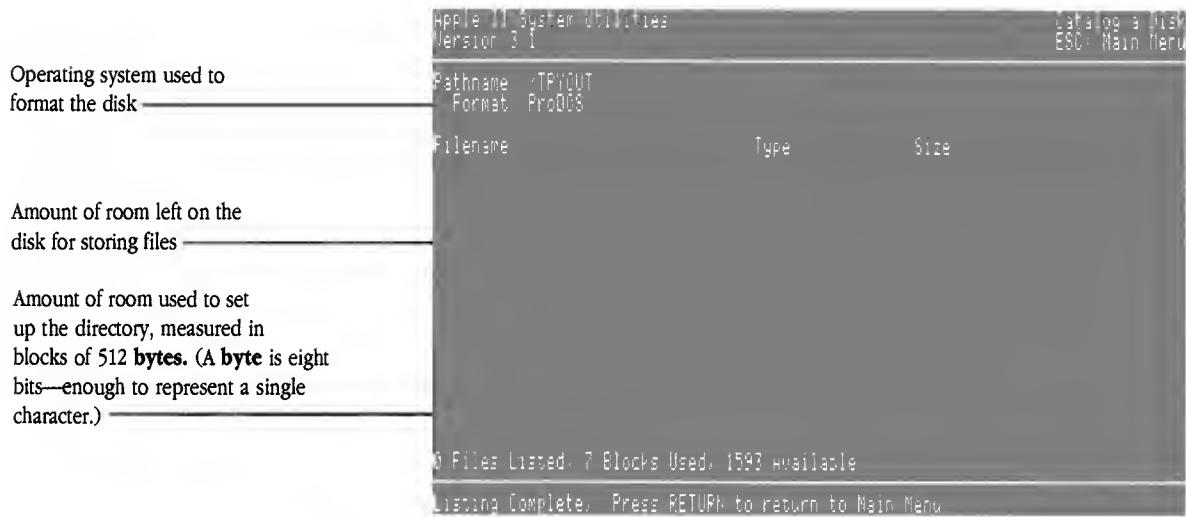


Figure 2-7
The disk directory

You have a directory—and plenty of room to store files on the disk. The formatting was successful.

4. To return to the Main Menu, press Return.

You're now ready to create a subdirectory on this disk and copy a file into it.

Creating a subdirectory

At this point, you could stop using the utilities, start using an application to create documents, and save them on your formatted disk. But you may want to consider setting up a **subdirectory** on your newly formatted disk.

Right now, with no files on the disk, the directory is easy to read. And with only a few documents saved on the disk, you'll be able to spot the one you need right away. (See Figure 2-8.)

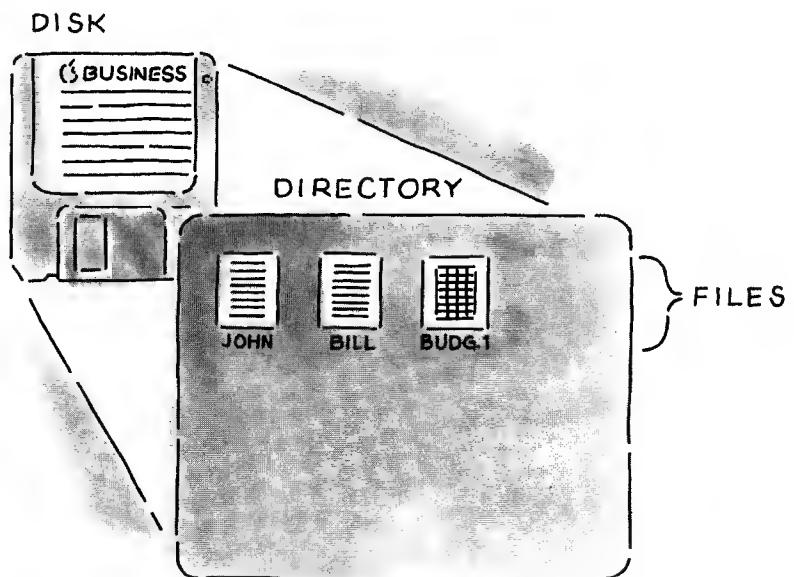


Figure 2-8
A few letters on a disk

But as you do more work, adding more and more files to the disk, it takes more time to search through the directory for a particular file. (See Figure 2-9.)

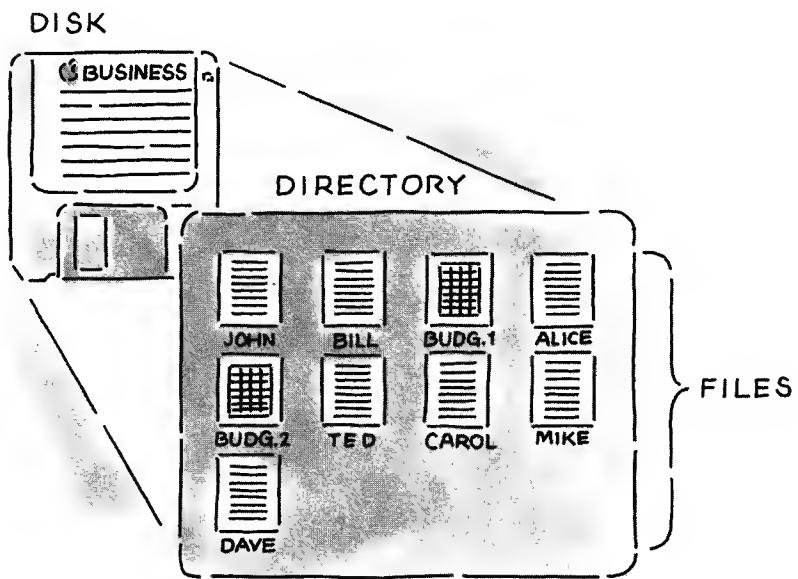


Figure 2-9
A lot of letters on a disk

To locate files more easily, you may want to keep related files together in subdirectories, the electronic equivalent of large file folders. A subdirectory contains a group of individual files and a list of those files—sort of a minidirectory.

The first step in organizing is deciding on a likely category for a subdirectory. For example, if your disk were filling up with letters, among other documents, you might want to create a subdirectory called LETTERS and copy all your correspondence into that subdirectory. Your main directory would look a lot less cluttered. (See Figure 2-10.)

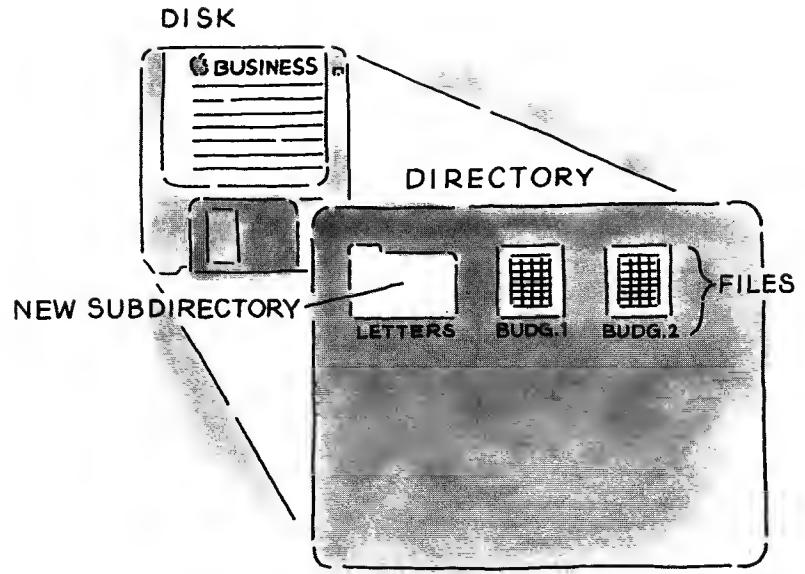


Figure 2-10
A disk with a subdirectory for letters

Only when you open that subdirectory will you see your letters. (See Figure 2-11.)

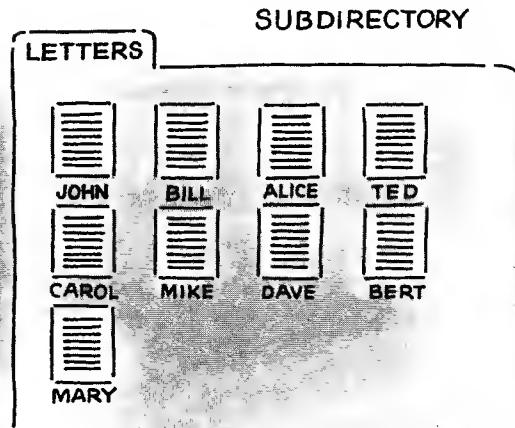


Figure 2-11
Inside the subdirectory called LETTERS

You must create the subdirectory before you can put any files into it. Follow these steps to create a subdirectory on the TRYOUT disk:

1. In the Main Menu, choose Create Subdirectory and press Return.

If you're starting up again, make sure that the working copy of the system disk is in your startup drive and that you have your formatted TRYOUT disk at hand; then turn on the power.

- ❖ *By the way:* This option is listed under the heading "Work on ProDOS Disks Only." That's because you can create subdirectories only on disks formatted with the ProDOS operating system. Earlier operating systems, such as DOS 3.3, were designed for 5.25-inch disks, which can hold only 143K of data; such disks are too small for subdirectories to be necessary. ProDOS was developed so you can work with larger disks; for instance, a 3.5-inch disk can hold about 800K of data—a lot more files. To help you keep track of all these files, ProDOS lets you create subdirectories.

A message asks how you want to specify the location of your disk.

2. With the Slot and Drive option highlighted, press Return.

You're choosing to specify the slot and drive number of the disk on which you want to create a subdirectory.

3. Type the numbers of the slot and drive that will contain the TRYOUT disk, then press Return.

If you're using the startup drive, replace the working copy of the system disk with the TRYOUT disk and specify its slot and drive numbers. If you're using a second disk drive, make sure the TRYOUT disk is there, then specify the slot and drive numbers.

4. Name the new subdirectory LETTERS.

Simply type the name and press Return.

In a few seconds, you see the message "Create complete" on the bottom line of the display. The subdirectory has been created.

5. To return to the Main Menu, press Return.

- 6. To see what the directory looks like now, choose Catalog a Disk and press Return.**
- 7. Press Return to accept the slot-and-drive method of specifying the location of the TRYOUT disk.**
- 8. Specify the location of the TRYOUT disk and press Return.**

For information on location, see “About System Utilities” in Chapter 1.

The new subdirectory shows up at the top of the directory. (See Figure 2-12.)



Figure 2-12
The subdirectory appears in the directory

The subdirectory is now ready to receive files.

- 9. Press Return to return to the Main Menu.**

Copying a file

A **backup copy** of a file or disk is one you keep in a safe place, to be used if you happen to lose or ruin your original.

To neaten up the disk, or to make a **backup copy** of an important file, you need to use the utilities to copy a file from one disk to another. If you want to place the copy in a subdirectory, you can do so as part of the copying procedure.

In this section of the tutorial, you'll copy the file COPY.ME from your working copy of the system disk into the subdirectory LETTERS on your new disk TRYOUT.

1. **If you have only one drive, remove TRYOUT and replace it with the working copy of the system disk. If you have two drives, make sure the working copy of the system disk is in the startup drive and the TRYOUT disk is in one of the other drives.**

The working copy of the system disk is the source of your files, so it must be the first disk the utilities examine.

2. **In the Main Menu, use the arrow keys to highlight the Copy Files option; then press Return.**

A message asks which method you want to use to identify the source disk (the disk that will be the source of your files). For now, continue to use slot and drive numbers.

3. **With the highlighting still on Slot and Drive, press Return.**

You are choosing to identify the source disk by its physical location. You see this message:

Where is your source disk?

Slot 5 Drive 1

4. **Press Return to accept the default slot and drive numbers, or type new numbers and press Return.**

A message asks which method you want to use to identify the location of the destination disk (the disk onto which you are going to copy these files). In order to put the files into your new subdirectory, you need to provide a more specific location than the slot and drive. You need to name the disk and the subdirectory. That's what the ProDOS **pathname** allows.

A **pathname** provides a trail of names leading the computer first to the disk, then to the subdirectory, if any, and eventually to the file.

5. Move the highlighting to ProDOS Pathname and press Return.

You see the message shown in Figure 2-13.



Figure 2-13

Specifying where you want the file to be copied

6. Press Control-X to erase the suggested name; then type TRYOUT/LETTERS and press Return.

You are providing the names of the disk and subdirectory you want to copy the file into.

A message asks whether you want to copy all the files or just some.

7. To copy some files, press Return.

A list of all the files on the working copy of the system disk appears. (See Figure 2-14.) You will copy only COPY.ME.

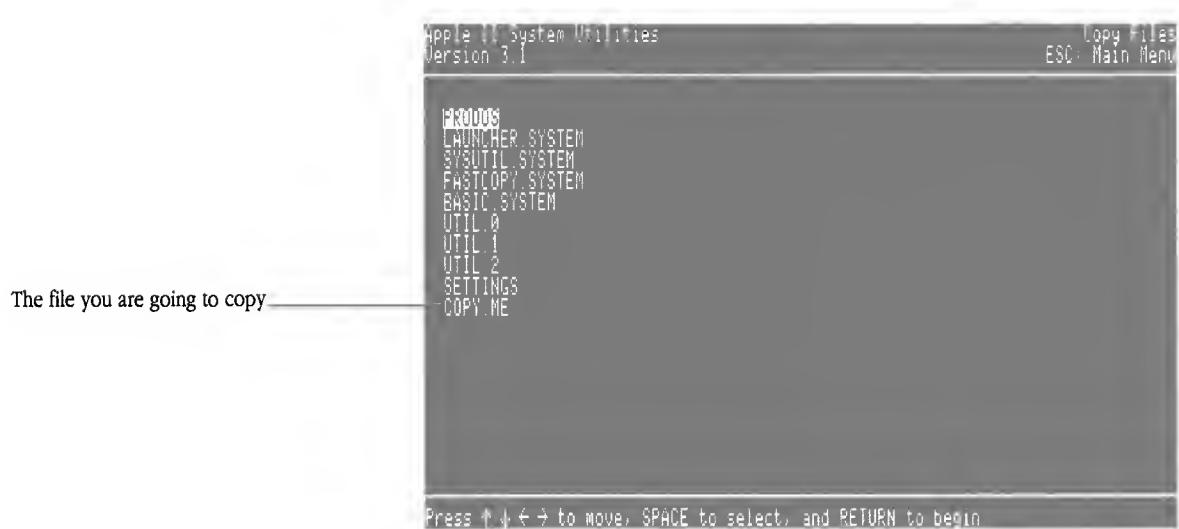


Figure 2-14
Specifying which file you want to copy

8. Use the arrow keys to highlight COPY.ME. Press the Space bar to select it, then press Return.

(If you need to deselect another file, use the arrow keys to highlight it, then press the Space bar again.)

The utilities immediately start copying the file. If you are using only one disk drive, you are asked after a few seconds to remove the working copy of the system disk and replace it with TRYOUT, your destination disk.

9. Follow any messages prompting you to swap disks.

If you are using the startup drive and one other disk drive, you won't have to swap disks.

With one disk drive, you'll need to remove the system disk and replace it with TRYOUT; then press Return.

When the file has been copied, you see the message shown in Figure 2-15.



Figure 2-15
Copying is complete

10. To return to the Main Menu, press Return.

Now that you've added this file, you may want to see what the subdirectory LETTERS looks like.

11. In the Main Menu, highlight Catalog a Disk and press Return.

12. Highlight ProDOS Pathname and press Return.

The pathname is your entry into the subdirectory. (Slots and drives take you only to the disk's main directory.)

13. Type /TRYOUT/LETTERS and press Return.

That provides the pathname to the subdirectory on your disk:
/TRYOUT/LETTERS.

Figure 2-16 shows what the subdirectory looks like now.



Figure 2-16
The subdirectory called LETTERS

14. Press Return to return to the Main Menu.

Congratulations!

You've completed a detailed hands-on introduction to the utilities. You should be prepared to undertake almost any operation.

For more information about common procedures used with the utilities, read Chapter 3, "General Instructions on Using the Utilities."

You'll find step-by-step directions for each option on the Main Menu, arranged in the order of appearance, in Chapters 4, 5, and 6.

- Chapter 4 covers commands that work on entire disks.
- Chapter 5 covers commands that work on individual files.
- Chapter 6 covers commands that work on ProDOS disks only.

General Instructions on Using the Utilities

T

HIS CHAPTER SHOWS YOU HOW TO START THE UTILITIES AND PERFORM SOME OF the common tasks involved in using them:

- getting help
- selecting an option from the Main Menu
- specifying the location of disks and files
- selecting files
- naming disks and files
- choosing an operating system
- escaping and quitting

Use the keyboard to communicate with the utilities even if you also have a mouse.

Starting up

Here's how to start the utilities programs on the system disk:

1. **Put the system disk (or your working copy of it) in the startup drive.**
2. **If the power is off, turn the power on. If the computer is already on, press Command-Control-Reset.**

You see the System Disk menu, shown in Figure 3-1.

If you don't see the System Disk menu, use this checklist to see if you can correct the problem:

- Is the computer plugged into an electrical outlet?
- Is the monitor also plugged in?
- If the computer or monitor is plugged into a power strip, is the strip turned on?
- Is the monitor connected to the computer?
- Is the system disk in the startup drive?
- Is the computer's power switch turned on?
- Is the monitor's power switch turned on?
- Are the monitor's contrast and brightness settings adjusted correctly?

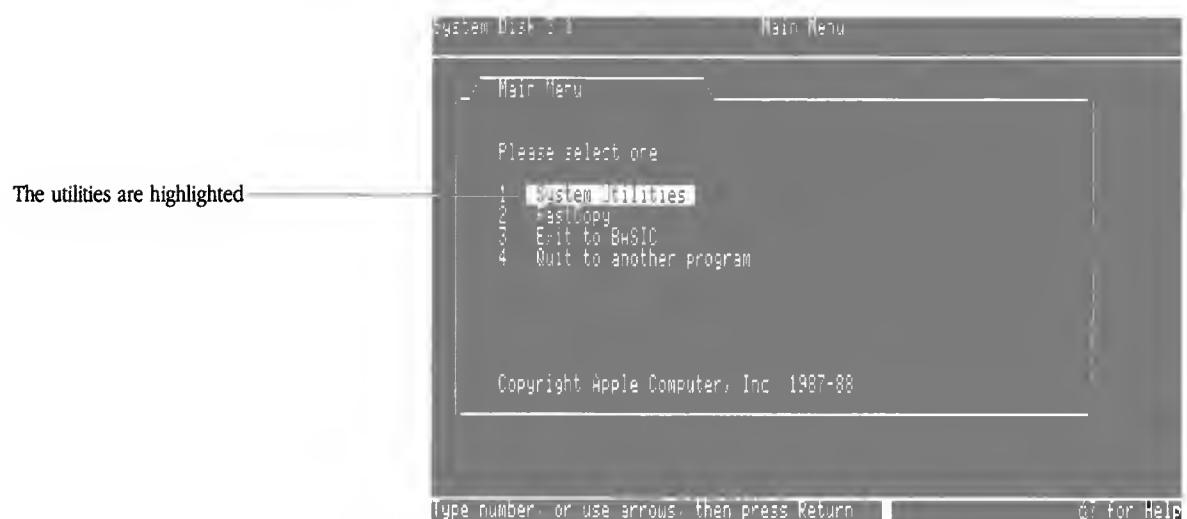


Figure 3-1
The System Disk menu

3. With the highlighting on System Utilities, press Return.

You see the Main Menu of the utilities.

Getting help

When you want to find out more about one of the options in the Main Menu, here's how to get background information on a function:

1. Highlight the option, but don't press Return.

2. Press Command-?

You don't need to press Shift when you press the question mark key.

In general, help is available when you are in the Main Menu or when you are specifying the location of a disk or file.

3. When you've read the advice, press Return to get rid of the Help box.

For advice on what to do next, you can always look just *above* the line at the bottom of the screen. (See Figure 3-2.)



Figure 3-2
The Main Menu of the utilities

Selecting from the Main Menu

Here's how to choose one of the options in the Main Menu:

1. Use the arrow keys to move the highlighting to the function you want. (See Figure 3-3.)

Notice that the functions on the menu are grouped into categories devoted to whole disks, individual files, ProDOS disks and files, and other options.

2. When you have highlighted the function you want, press Return.

From any point in the utilities, you can return to the Main Menu by pressing Esc as many times as necessary. You can do this at any time.

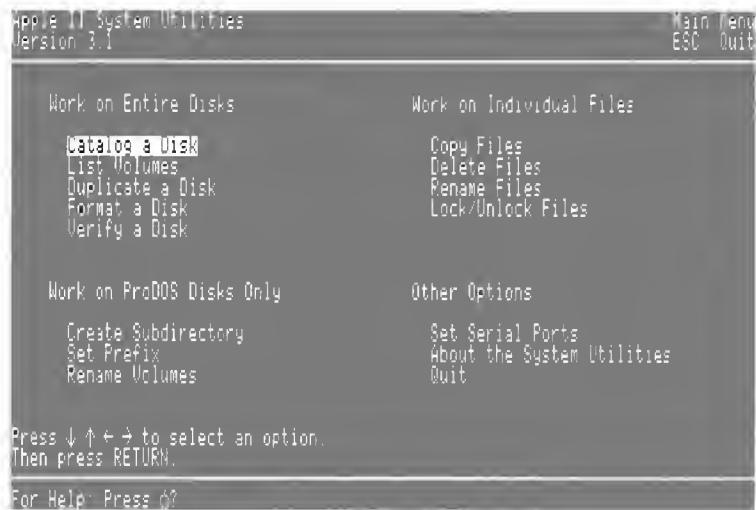


Figure 3-3
Selecting an option

Specifying the location of disks and files

In many circumstances, when you choose an option in the Main Menu, you see the screen shown in Figure 3-4.



Figure 3-4
Specifying the location of your disk

You need to tell the utilities where to find the disk you want to work on. There are two ways to do so: by identifying the physical location of the disk or by spelling out the pathname leading to the disk. First you pick the method, then you give details.

1. **Specify the way you want to identify the disk's location by highlighting the Slot and Drive option or the ProDOS Pathname option, and then pressing Return.**

If you don't know the disk's name or don't feel like typing it, you'll find it convenient to use the slot-and-drive method. Use the pathname method when you're not sure which drive a disk is in or when you want to go directly into a particular subdirectory.

2. **If you are providing slot and drive numbers, accept or change the suggested slot number; then press Right Arrow to move the highlighting to the drive number, accept or change that entry, and press Return.**

You can also move the highlighting between the Slot and Drive boxes by pressing the Tab key.

If you have chosen to use the ProDOS pathname to identify the disk, a message appears giving the name of a disk.

- To erase the name completely, press Control-X or type a slash (/).
- To edit the name, press Left Arrow or Right Arrow to move the cursor (the blinking underline).
- To delete the character to the left of the cursor, press Delete.
- To insert characters to the left of the cursor, start typing.

The pathname begins with a slash, followed by the name of the disk. That's all you need to identify the disk itself. If you want to work on a file in a subdirectory, you must add another slash, followed by the name of the subdirectory. For instance, to indicate the route to the files in the subdirectory LETTERS on the disk TRYOUT, you would type /TRYOUT/LETTERS and press Return.

For more information about slots and drives, see "About System Utilities" in Chapter 1.

Selecting files

When you choose one of the utilities that works on files, you're asked whether you want the operation to apply to all the files on the disk or in the subdirectory, or only to some of them. If you choose all, the operation begins. If you choose some, you see a list of the files on the disk or in the subdirectory you specified. (See Figure 3-5.) Here's how to select one or more of those files:

1. Use the arrow keys to highlight a file you want to work with.
2. Press the Space bar to mark the file. (To remove the check mark, press the Space bar again).
3. Repeat steps 1 and 2 for each file you want to work with.
4. When you have marked all the files you want, press Return.



Figure 3-5
Marking files

Naming disks and files

You can use the utilities to rename a file or a ProDOS disk without changing its content, and to name a disk when you format it. In general, keep the name short so that you won't have to type much, but make sure to choose a meaningful name that you'll recognize a few months from now.

In choosing names for your disks and files, keep the following rules and suggestions in mind:

- Begin with a letter.
- Subsequent characters can be letters, numbers, or periods. (Do not use spaces or punctuation marks other than periods.) Where you would normally put a space, it's often helpful to use a period.
- The names of disks formatted with ProDOS, and of files stored on those disks, can be up to 15 characters long.
- The names of disks formatted with the Pascal operating system can have up to 7 characters. The names of Pascal files can have up to 15 characters.
- If you have a number of similar files, you may want to start their names with the same few letters. For example, you might name your letters to your mother *Mom1*, *Mom2*, and *Mom3*. Because filenames appear in alphabetical order, related files will show up together.
- You *can* assign the same name to two different files, as long as they are in separate subdirectories. But to avoid confusion, it's best not to do so.

Creating a new name

Here's how to create a name from scratch:

1. To erase all the characters in the suggested name, press Control-X or type a slash.
2. Type the new name.
3. When the name appears exactly as you want it, press Return.

Editing an existing name

Here's how to alter a suggested or existing name:

1. Use the following techniques to edit the name:

- To move the cursor (the blinking underline), press Left Arrow or Right Arrow.
- To erase all characters in a line, press Control-X.
- To erase all characters to the right of the cursor, press Control-Y.
- To delete the character to the left of the cursor, press Delete.
- To insert characters to the left of the cursor, just start typing.

2. When the name appears exactly as you want it, press Return.

Creating a pathname

A pathname provides the utilities with a path leading to a subdirectory or a file. Here are the rules for creating a pathname:

- Each part of the pathname begins with a slash.
- The first part is the disk name.
- The next part is the subdirectory, or a series of subdirectories, if needed.
- The last part is the filename, if needed.
- The maximum number of characters, including slashes, is 64.

For information on renaming files, see "Renaming Files" in Chapter 5. For information on naming a subdirectory and using a pathname, see "Creating a Subdirectory" and "Setting a Prefix" in Chapter 6. For information on renaming a ProDOS disk without changing its contents, see "Renaming a ProDOS Disk" in Chapter 6.

❖ *For Pascal users:* You can't rename a Pascal disk with a single command, as you can a ProDOS disk. You can, however, use the Duplicate a Disk option (described in Chapter 4) to copy a Pascal disk and give the copy a new name. You can also format a new disk with Pascal, giving it the new name, and then copy the files from your old disk to the new one.

Choosing an operating system

When formatting a disk, you need to decide which operating system to use. You can choose either ProDOS or Pascal.

Each application depends on an operating system as a kind of subcontractor to carry out tasks such as transferring data from a disk to the central processing unit and back. The application is said to be *based* on that operating system. When you save or copy a file created in that application, you must store it on a disk that has been formatted for the application's operating system. If you don't, the application won't be able to retrieve the file later.

To decide which operating system you want to use in formatting a disk, you need to know what operating system the application uses. If you're not sure, look on the program disk's label or check the owner's guide for the application. You can also use the Catalog a Disk option in the Main Menu of the utilities to find out what operating system an application uses.

When copying files, remember to make sure you are placing the files on a disk formatted with the application's own operating system.

Working with Pascal disks and files

Pascal disk names can be up to 7 characters long. Pascal filenames can be up to 15 characters long.

Some options in the Main Menu work only on ProDOS disks and files because ProDOS is the only Apple II operating system that supports subdirectories. The Pascal operating system was designed for 5.25-inch disks, which can hold only 143K of data. On disks of that size, subdirectories are unnecessary, so Pascal does not let you create them. Nor does it let you set up a prefix.

Working with other non-ProDOS disks and files

DOS was the original operating system for the Apple II family of computers; **3.3** is a version number.

You can use the Copy Files option to copy **DOS 3.3** files to disks formatted with DOS 3.3. (The utilities on the *Apple II System Disk* will not format a disk with DOS 3.3; you'll have to use BASIC or a DOS 3.3 utility to do so.)

You can also copy DOS 3.3 files onto a ProDOS disk. This procedure transforms these files into ProDOS files that can then be retrieved and read by a ProDOS-based application such as AppleWorks®. But the original DOS 3.3 application will no longer be able to retrieve or read the file.

- ❖ *By the way:* You can catalog a disk formatted with DOS 3.2 or CP/M, but you cannot use any of the other utility options on those disks.

Escaping and quitting

You can return to the Main Menu from anywhere in the utilities—just by pressing Esc. If you're not sure whether to proceed with a function, you can always back out by pressing Esc.

1. To return to the Main Menu, press Esc.

You may need to follow this step more than once.

2. To leave the utilities from the Main Menu, choose Quit.

You will see a message asking whether you really want to quit. If you do, highlight Yes and press Return. After a few seconds you see the System Disk menu.

If you want to run an application after you quit, put your application disk in the startup drive and start up the computer again by pressing Command-Control-Reset.

If you want to do some programming, keep the system disk in the startup drive and choose Exit to BASIC from the System Disk menu.

If you want to run another ProDOS application without restarting the computer, choose "Quit to another program" from the System Disk menu and replace the system disk with the startup disk for that application. You can then start the application by typing the prefix (the disk name in this case), pressing Return, typing the rest of the pathname that leads to its startup or system file, and then pressing Return again. The startup file is the one whose name ends in .SYSTEM. For instance, if the disk name is CALC and the startup file is CALC.SYSTEM, you would type /CALC/, press Return, then type CALC.SYSTEM and press Return again. (To find the disk name and the name of the startup file, use the Catalog a Disk option in the utilities.)

Working With Disks

IN THIS CHAPTER, YOU'LL LEARN HOW TO USE THE UTILITIES FOR TASKS INVOLVING whole disks:

- cataloging a disk (showing you what files are on it)
- listing volumes (showing what disks are in your disk drives)
- duplicating a disk (making a copy)
- formatting a disk (preparing it to receive data)
- verifying that a disk is readable

In addition, the utilities allow you to rename a disk that has been formatted using the ProDOS operating system; this procedure is covered in Chapter 6, “Working With ProDOS Disks and Files.”

The instructions in this chapter assume that you know how to

- start up
- get help
- select from the Main Menu (Figure 4-1)
- specify the location of disks and files
- select files
- name disks and files
- choose an operating system

See Chapter 3, “General Instructions on Using the Utilities,” if you need more information about any of these procedures.

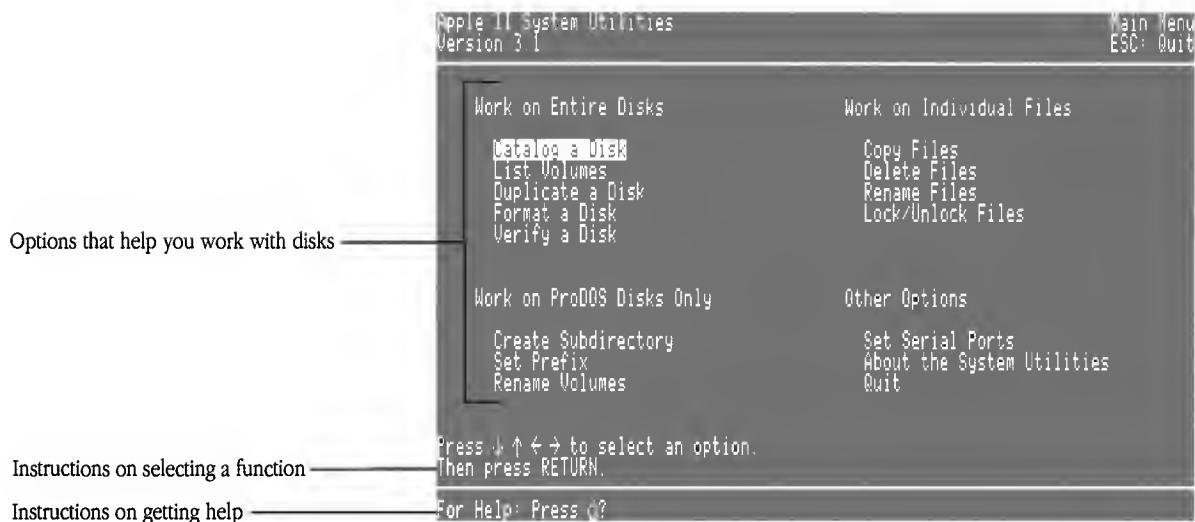


Figure 4-1
The Main Menu of the utilities

Cataloging a disk

You may want to know what files are on a particular disk or what the disk's name is. This information is contained in the disk's directory. When you catalog a disk, you can find out its operating system and name, the name of every file on the disk, the type and size of each file, and the amount of space available on the disk.

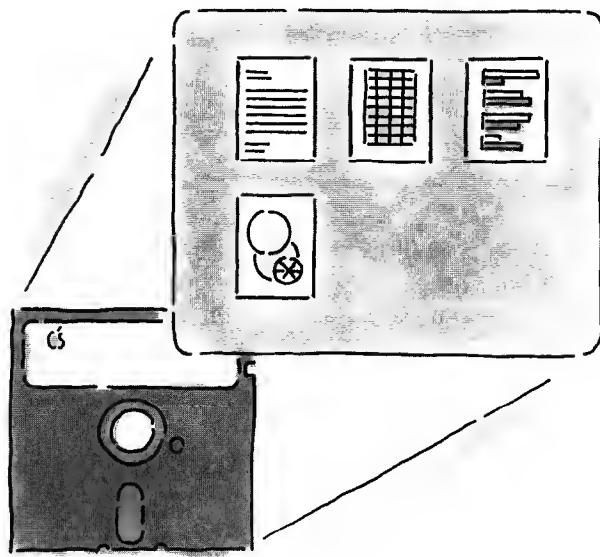


Figure 4-2
Cataloging a disk

1. In the Main Menu, choose Catalog a Disk and press Return.
2. If you are using only one drive, replace the system disk with the disk you wish to catalog. If you are using a second drive that can accept the disk, insert the disk you wish to catalog in that drive.

3. Choose the way you want to identify the location of the disk to be cataloged; then specify the location of the disk.

When you specify the location of a disk by name or by physical location, the utilities display a list of the top level of files but do not open any subdirectory. (See Figure 4-3.) To find out what files are contained in a particular subdirectory, use the ProDOS pathname to specify the location of the subdirectory. Type a slash, the disk name, another slash, and the subdirectory name, like this:

/TRYOUT/LETTERS

Then press Return.

The utilities provide a catalog of the files in the subdirectory.

For more information on slots and drives, see “About System Utilities” in Chapter 1.

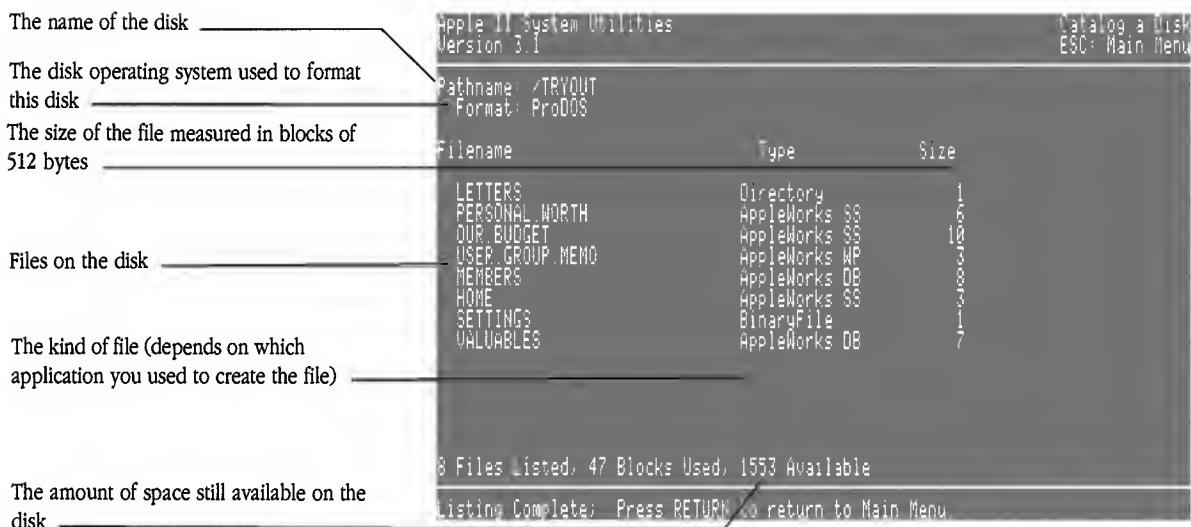


Figure 4-3
The Catalog a Disk screen

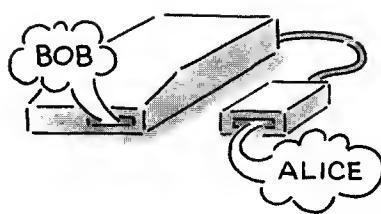


Figure 4-4
Listing volumes

When you're working with 5.25-inch and 3.5-inch disks, a **volume** is the same as a disk.

Listing volumes

Sometimes you need to identify which disk is in which drive. When you list volumes, you see the names and operating systems of all formatted disks in drives connected to your computer. You also see the slot and drive numbers corresponding to those drives.

If you have a hard disk, you may have carved it up into several storage areas, known as *volumes*; if these volumes are formatted correctly, their names will also appear on your list.

1. If you are using one drive, replace the system disk with the disk you want identified. If you are using more than one drive, make sure the disks are in the drives.
2. In the Main Menu, choose List Volumes; then press Return.

You see a list of all the formatted disks you can use. (See Figure 4-5.) If a particular disk drive does not appear, make sure that it has a formatted disk in it and that the connection with the computer is secure.

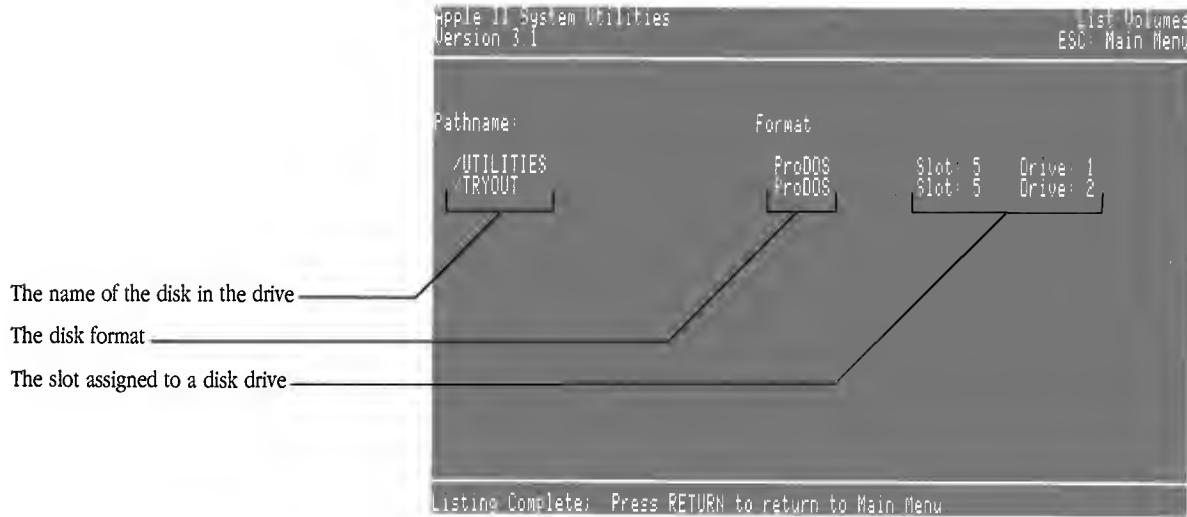


Figure 4-5
The List Volumes screen

Duplicating a disk

Using this option, you can copy all the information from one disk onto another of the same size. If you want to copy all the information from one disk onto another of a different size (5.25-inch disks to 3.5-inch disks or vice versa), see “Copying files” in Chapter 5.

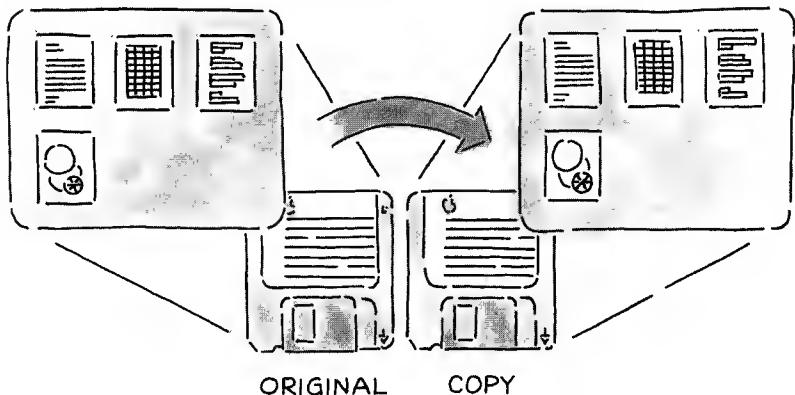


Figure 4-6
Duplicating a disk

△ Important

If you have only one drive that can handle disks the same size as your original, you should choose FastCopy in the System Disk menu, described in Chapter 1; if you want to copy just a few files, you should choose Copy Files in the Main Menu of the utilities, described in Chapter 5. Using the Duplicate a Disk option with only one drive is possible, but it involves many disk swaps and can be a tedious procedure. △

1. In the Main Menu, choose **Duplicate a Disk** and press Return.
2. Specify the location of the source disk (the one you want to duplicate).

For information on slots and drives, see “About System Utilities” in Chapter 1.

3. Specify the location of the destination disk.

You can use an unformatted disk or one with unwanted data on it as a destination disk. The utilities will reformat the disk before making the copy, wiping out any existing data, so be sure the destination disk contains nothing you need. If you have any doubt, press Esc to return to the Main Menu; then choose Catalog a Disk and make sure there are no files you still want on the disk.

The destination disk must be the same size as the source disk. You cannot use the Duplicate a Disk option to copy the contents of a 3.5-inch disk onto a 5.25-inch disk or vice versa. You can use Copy Files, described in Chapter 5, to copy individual files between disks of different sizes.

4. You'll see a message asking you to insert the source and destination disks. (See Figure 4-7.) If you haven't already done so, insert the disks and press Return.

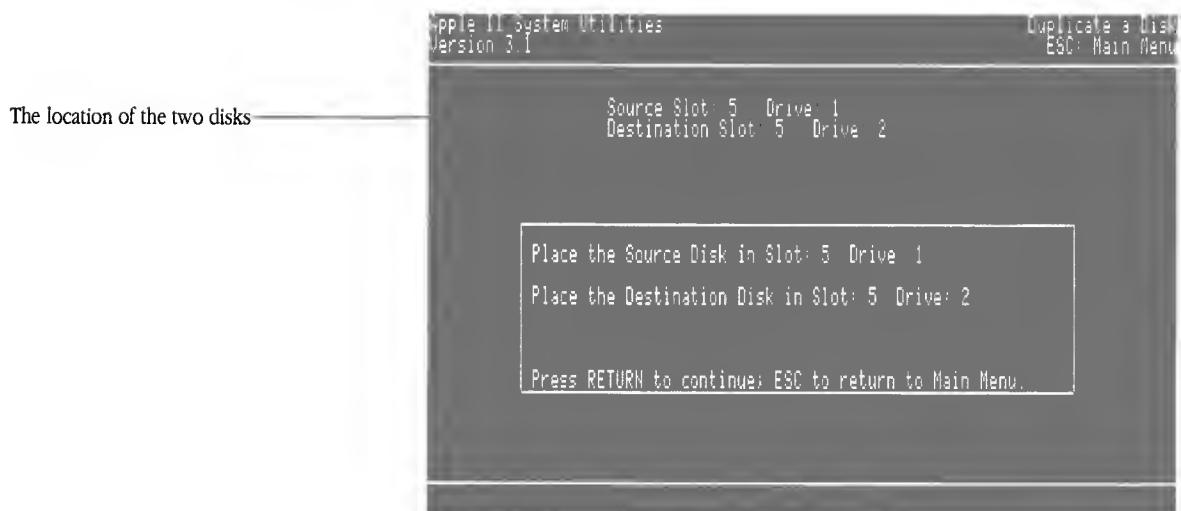


Figure 4-7
The Duplicate a Disk screen

5. Accept the suggested name for the backup disk by pressing Return, or create a new one and then press Return.

See “Naming Disks and Files” in Chapter 3 for a list of rules for naming disks.

6. If your destination disk has previously been formatted, it may have some data on it; if so, a message asks whether you want to destroy the disk. This does not mean that your disk will be physically harmed, but before duplicating, the utilities will reformat the destination disk, erasing any data now on it. If you are sure you do not need any of the data on the destination disk, choose Yes and press Return. If you have any doubt, choose No; that takes you back to the Main Menu. Then choose Catalog a Disk to make sure that the disk contains no files you want to preserve.

Formatting a disk

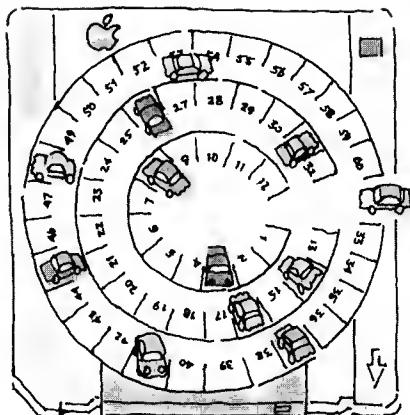


Figure 4-8

Formatting a disk

Before you can save a document or copy files to a blank disk, you need to prepare the disk to store data. This process is known as **formatting** the disk. Formatting erases any data that happens to be on the disk, so if you’re not sure what’s on a data disk that you’re thinking of formatting, you should first use the Catalog a Disk option to see what files are there and to assure yourself that you don’t need any of those files.

❖ *By the way:* You don’t have to format a disk if you intend to use it as the destination disk when duplicating a whole disk; the duplicating option automatically reformats the destination disk, wiping it clean so that it can receive the new data.

1. In the Main Menu, choose Format a Disk and press Return.
2. Confirm that you will identify the location of the disk you want to format by slot and drive; then specify its location.

For information on slots and drives, see “About System Utilities” in Chapter 1.

3. Choose the disk operating system required by the application you'll be using to create files for this disk.

If you are not sure which operating system the application requires, press Esc to return to the Main Menu; insert the application disk in your startup drive and use the Catalog a Disk option. You'll see the name of the operating system at the top of the display.

4. Type the name you want to give the disk when it's formatted and press Return, or accept the one that's suggested by pressing Return.

See "Naming Disks and Files" in Chapter 3 for a list of rules on naming disks.

5. When prompted, place the disk you wish to format in the drive you specified in step 2. Press Return. (See Figure 4-9.)
6. If the disk has already been formatted, you will see a message asking whether it's okay to destroy the existing data on the disk as part of reformatting it. This does not mean that the utilities will physically harm your disk, but formatting will erase any data now on it. If you are sure you do not need any of the data on the disk, choose Yes and press Return. If you have any doubt, choose No and press Return; then choose Catalog a Disk to make sure that the disk contains no files you want to preserve.

Some copy-protected disks cannot be cataloged. To find out the operating system, check the manual that came with the application.

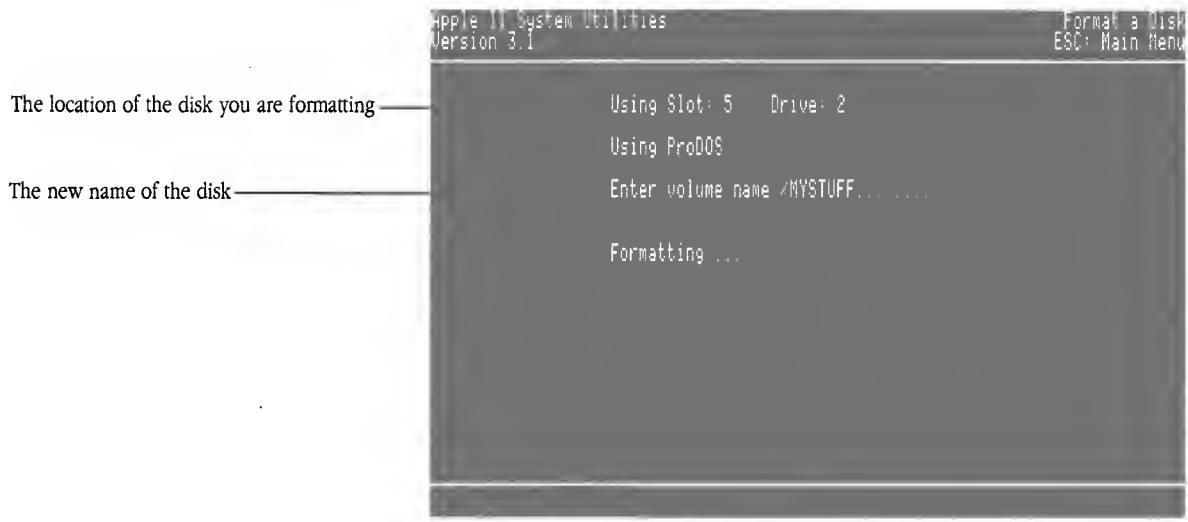


Figure 4-9
The Format a Disk screen

In the process of formatting, three things happen:

- The disk is divided into sections where information can be stored.
- A directory—an empty list waiting to record the names of files you save on the disk—is set up on the disk.
- The name you typed or accepted is assigned to the disk as its **volume name**.

Once the disk has been prepared to receive data, it is known as a *volume*. You are now ready to save files onto this disk from any application that uses the operating system (ProDOS or Pascal) that you formatted it with.

Verifying that a disk is readable

Sometimes things go wrong. You may see a message saying that the computer can't read a file or a disk. Perhaps your application won't start, or it seems to start, but then garbled characters fill the display. Reinsert the disk, making sure to place it securely, check all the connections, and then try again. If you still have problems, make sure the disk has been formatted for the same operating system your application uses, and then try again.

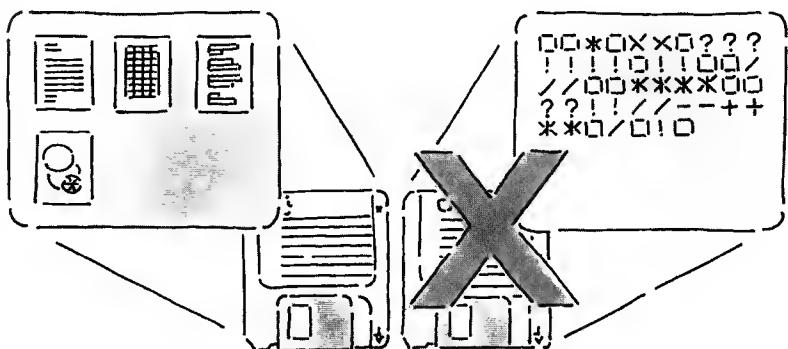


Figure 4-10
Verifying that a disk is readable

If the disk still can't be read, there may have been some physical damage to the disk. Here's how to make sure that a disk is readable:

1. **In the Main Menu, choose Verify a Disk and press Return.**
2. **Insert the disk.**
3. **Press Return to confirm that you will use the slot-and-drive method to identify the location of the disk; then specify its slot and drive.**

For information on slots and drives, see "About System Utilities" in Chapter 1.

If the utilities find errors or problems, use Copy Files to copy all the files—or any files that you can—onto another disk. Then reformat the disk and check it again, using the Verify a Disk option. If errors show up again, try another disk in the same drive. If that disk can't be read, have your authorized Apple dealer check the drive. If the utilities verify other disks in that drive, throw the damaged disk away.

The message “No errors” means that a disk is undamaged and that any files on it should be readable by the application with which they were created. (See Figure 4-11.)

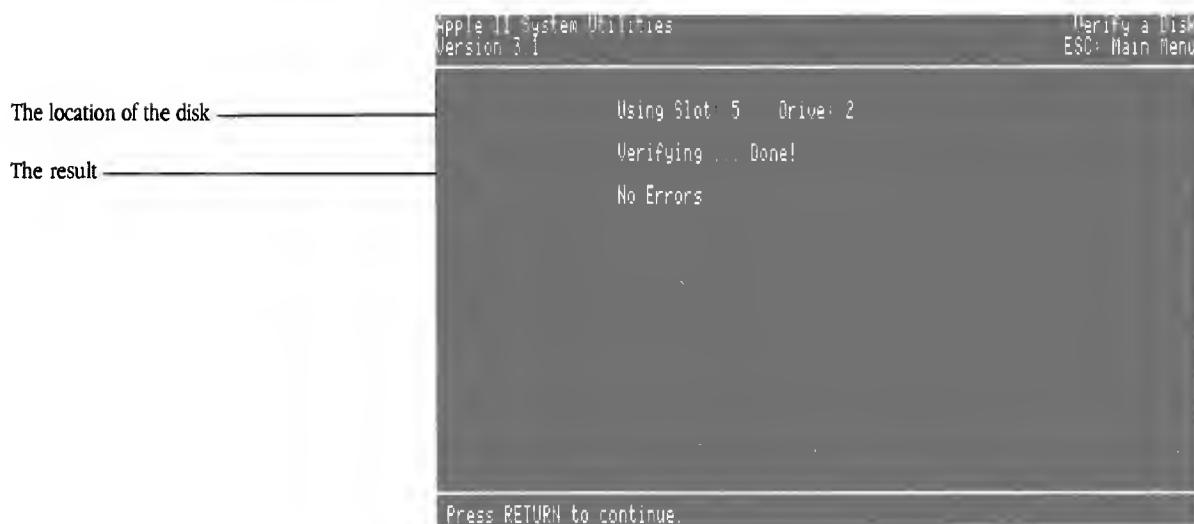


Figure 4-11
The Verify a Disk screen

Working With Files

IN THIS CHAPTER, YOU'LL LEARN ABOUT

- copying files
- deleting files
- renaming files
- locking and unlocking files

For files created with an application that uses ProDOS, you can also create a subdirectory; that task is covered in Chapter 6, “Working With ProDOS Disks and Files.”

The instructions in this chapter assume that you know how to

- start up
- get help
- select from the Main Menu (Figure 5-1)
- specify the location of disks and files
- select files
- name disks and files
- choose an operating system

See Chapter 3, “General Instructions on Using the Utilities,” if you need more information about any of these procedures.



Figure 5-1
The Main Menu of the utilities

Copying files

You can use the utilities to make a copy of one or more files, or to copy the contents of a 5.25-inch disk onto a 3.5-inch disk or vice versa.

Copying with only one disk drive can become tedious. One way to avoid it is to make more than one copy of a file when you are still in an application, saving the document to one disk, then saving it again to another disk. In this way, you can quickly make a backup copy without having to use the utilities.

Remember that you must copy a file onto a disk that has been formatted using the same disk operating system as that used by the application—so that the application can read the file. To ascertain which disk operating system the application uses, check the label of the program disk or the owner's guide for the application. You can also use the Catalog a Disk option.

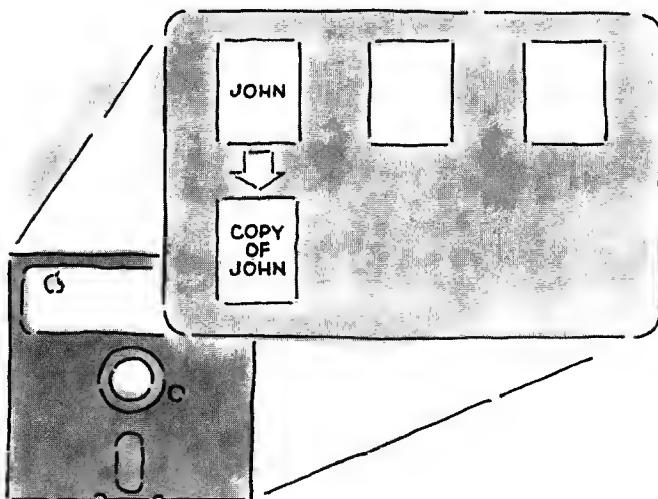


Figure 5-2
Copying files

- 1. In the Main Menu, choose Copy Files and press Return.**
- 2. Insert the source disk (the one with the files you want to copy).**
- 3. Choose the way you want to identify the location of the source disk; then specify its location.**

For information on slots and drives, see “About System Utilities” in Chapter 1.

- 4. If you are using more than one drive, insert the destination disk (the one that will receive the copies) in another drive.**

If you are using only one drive, remove the source disk when prompted and replace it with the destination disk. Press Return. (Depending on the size and number of the files you’re copying, you may need to exchange disks anywhere from 1 to 80 times to complete the copying; that’s why it’s a good idea to make copies of files from within the application.)

- 5. Choose the way you want to identify the location of the destination disk; then specify its location.**
- 6. Specify whether you want to copy all the files on the original disk or only some; then press Return.**

If some, press Up Arrow or Down Arrow to move through the list; mark each file you want to copy by pressing the Space bar. (To remove a check mark, press the Space bar again.) When you have marked all the files you want to copy, press Return.

If you try to copy a file onto a disk that already contains a file by that name, you'll be alerted with a message like this: "File ALAN already exists, delete it?" If you do not want the old version replaced with your copy, choose No and press Return, saying that it is *not* OK. If you want to update the old file, replacing it with the copy, choose Yes and press Return.



Figure 5-3
The Copy Files screen

Deleting files

Sometimes you need to free up disk space by permanently erasing one or more files. You can do so with the Delete Files option.

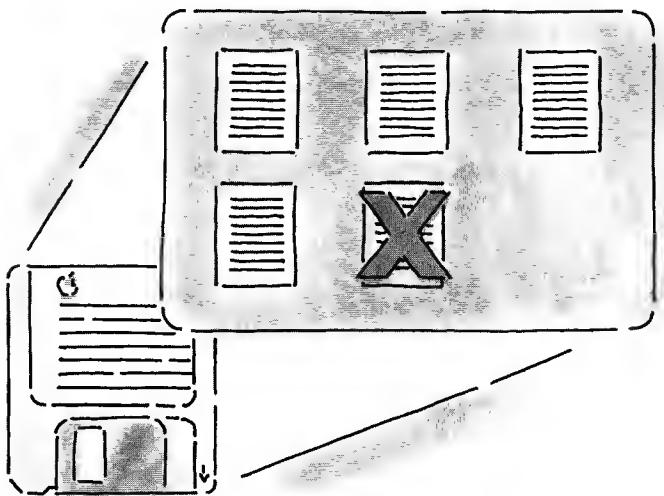


Figure 5-4
Deleting files

❖ *By the way:* If you want to delete every file on a disk, it's faster to use the Format a Disk option, which erases all data on a disk during formatting.

1. In the Main Menu, choose Delete Files and press Return.
2. If you have a second drive, insert the disk with files to be deleted in that drive. If you are using only one drive, be sure to remove the system disk and replace it with the disk containing the files you want to delete.

3. Choose the way you want to identify the location of the disk containing the files you want to delete; then specify its location.

For information on slots and drives, see “About System Utilities” in Chapter 1.

4. Specify whether you want to delete all the files on the disk or only some; then press Return. If some, select the files.

To select the files you want to delete, press Up Arrow or Down Arrow to move the highlighting; press the Space bar to select each file. Press the Space bar again to remove a check mark. When you have selected all the files you want to delete, press Return.

If a file is locked, you'll be warned before it is deleted; to override the protection and erase the file anyway, choose Yes and press Return. To cancel your command, choose No, then press Return.



Figure 5-5
The Delete Files screen

Renaming files

With this option you can change the name of a file without changing its contents.

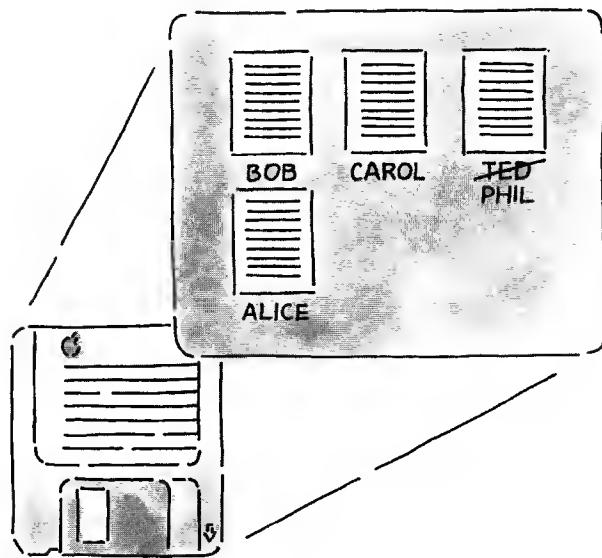


Figure 5-6
Renaming files

1. In the Main Menu, choose Rename Files and press Return.
2. Insert the disk that contains the files you want to rename in a disk drive. If you are using only one drive, be sure to remove the system disk and replace it with the disk containing the file.

3. Choose the way you want to identify the location of the disk containing those files; then specify its location.

To specify a file within a subdirectory, you must use the ProDOS pathname. For information about locations, see "About System Utilities" in Chapter 1.

4. Specify whether you want to rename all the files on that disk or in that subdirectory, or only some; then press Return.

If some, press Up Arrow or Down Arrow to move through the list, and press the Space bar to mark each file to be renamed. (Press the Space bar again to remove a check mark.) When you have selected all files to be renamed, press Return.

5. For each file, edit the original name, or erase it and type a new name. Then press Return.

See "Naming Disks and Files" in Chapter 3 for a list of rules for naming files.

To edit the original name, press Left Arrow or Right Arrow to position the cursor; then insert new characters to its left. To erase the character to the left of the cursor, press Delete. To delete all characters to the right of the cursor, press Control-Y. To delete all characters in the original name, press Control-X.

Locking and unlocking files

Sometimes you finish a document, and you don't want to change it. You can use the utilities to lock such a file to protect it from accidental changes, deletion, or renaming.

Later, if you decide to update the file, you can use the utilities to remove the protection, unlocking the file.

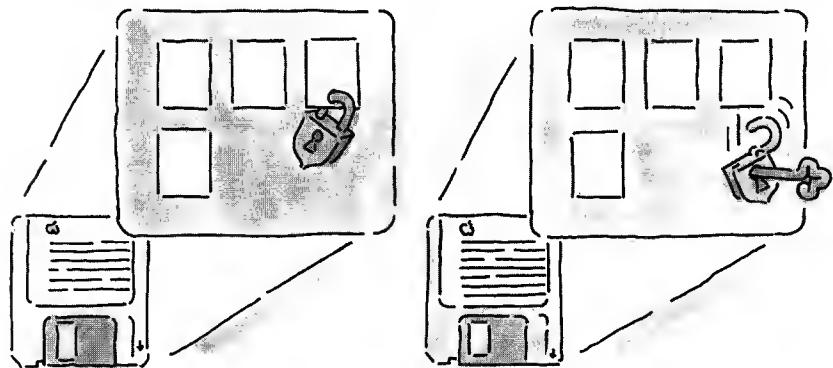


Figure 5-7
Locking files

Figure 5-8
Unlocking files

- ❖ *By the way:* You cannot lock or unlock files on a Pascal-formatted disk because that operating system does not allow this kind of protection. To protect Pascal files, **write-protect** the whole disk.

1. In the Main Menu, choose Lock/Unlock Files and press Return.
2. Insert the disk with the files you want to lock or unlock in a disk drive. If you are using only one drive, remove the system disk and replace it with the disk containing those files.

3. Choose the way you want to identify the location of the disk; then specify the location.

To specify a file within a subdirectory, you must use the ProDOS pathname when asked "Where is your disk?"

For information about locations, see "About System Utilities" in Chapter 1.

4. Indicate whether you want to lock or unlock the files.

Move the highlighting to Lock or Unlock, then press Return.

5. Specify whether you want to select all the files on that disk or only some; then press Return.

If some, press Up Arrow or Down Arrow to move through the list, then press the Space bar to select each file. (See Figure 5-9.) (Press the Space bar again to remove a check mark.) When you have selected all the files you want, press Return.



Figure 5-9
The Lock/Unlock Files screen

Working With ProDOS Disks and Files

M

OST OF THE UTILITIES ON THE SYSTEM DISK WORK WITH DISKS AND FILES

regardless of their operating system. But ProDOS, the most recent disk operating system for the Apple II family of computers, offers a little more than DOS 3.3 or Pascal. In this chapter, you'll learn about the additional options available when you're working with ProDOS files and disks:

- creating a subdirectory
- setting a prefix
- renaming a ProDOS disk (known as a *volume*)

The instructions in this chapter assume that you know how to

- start up
- get help
- select from the Main Menu (Figure 6-1)
- specify the location of disks and files
- select files
- name disks and files
- choose an operating system

See Chapter 3, “General Instructions on Using the Utilities,” if you need more information about any of these procedures.

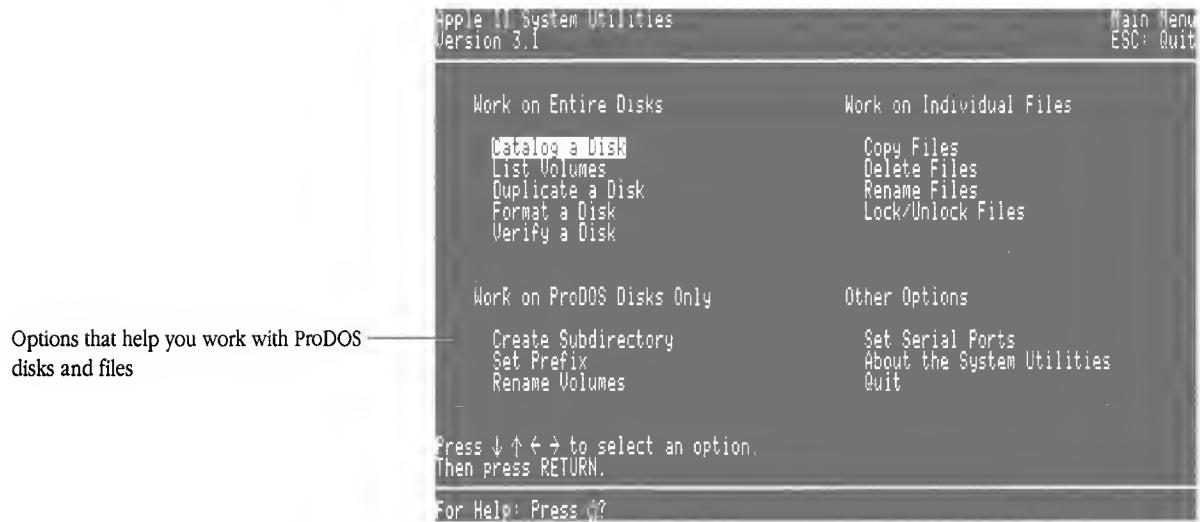


Figure 6-1
The Main Menu of the utilities

Creating a subdirectory

A subdirectory is like a folder that can contain related files and a list of those files—a miniature catalog that is subordinate to the main directory for the disk. Subdirectories help you to keep a disk directory from becoming cluttered. You can keep a group of related files in one folder and another group in another folder; that way, you won't have to hunt through a long list to find the one file you need.

Some applications that use ProDOS take advantage of its ability to create a subdirectory and save files to it within the application.

Other ProDOS-based applications require that you use the utilities to create the subdirectory. Once a subdirectory has been created, you can save files to it while in the application by supplying the pathname that leads to that subdirectory.

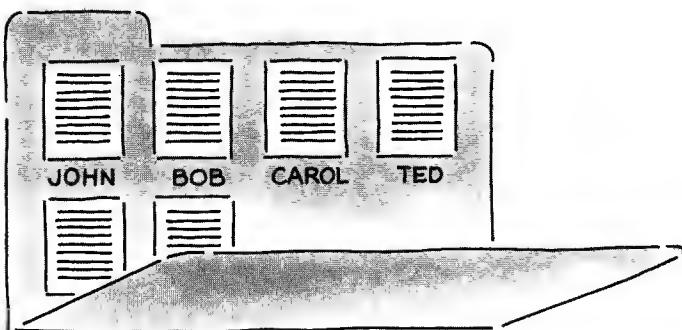


Figure 6-2
Creating a subdirectory

1. In the Main Menu, choose Create Subdirectory and press Return.
2. If you are using one drive, replace the system disk with the destination disk (the disk on which you want to create the new subdirectory). If you have a second drive, insert the destination disk in that drive.

3. Choose the way you want to identify the location of the disk on which you will create a subdirectory; then specify its location.

For information on slots and drives, see “About System Utilities” in Chapter 1.

4. Name the subdirectory.

See “Naming Disks and Files” in Chapter 3 for a list of rules on naming files.

Remember that a subdirectory is itself a file; it just happens to contain other files—and a list of those files, similar to the main directory but subordinate to it.

You can also create subdirectories within subdirectories. For instance, on a disk named MYSTUFF, you could create a subdirectory called WORK; in that subdirectory you could have two more subdirectories, one called ACCOUNTS, the other called LETTERS. And you could sort out your letters into further subdirectories named MEMOS, SUPPLIERS, CONTACTS, CLIENTS, and CONSULTING. Now that’s organized!

If you want to create a subdirectory within a subdirectory, you must use the ProDOS pathname method of specifying the location of the subdirectory to be created.

If you were putting the letter to your client John in its subdirectory, the pathname would be within the legal maximum of 64 characters:

/MYSTUFF/WORK/LETTERS/CLIENTS/JOHN

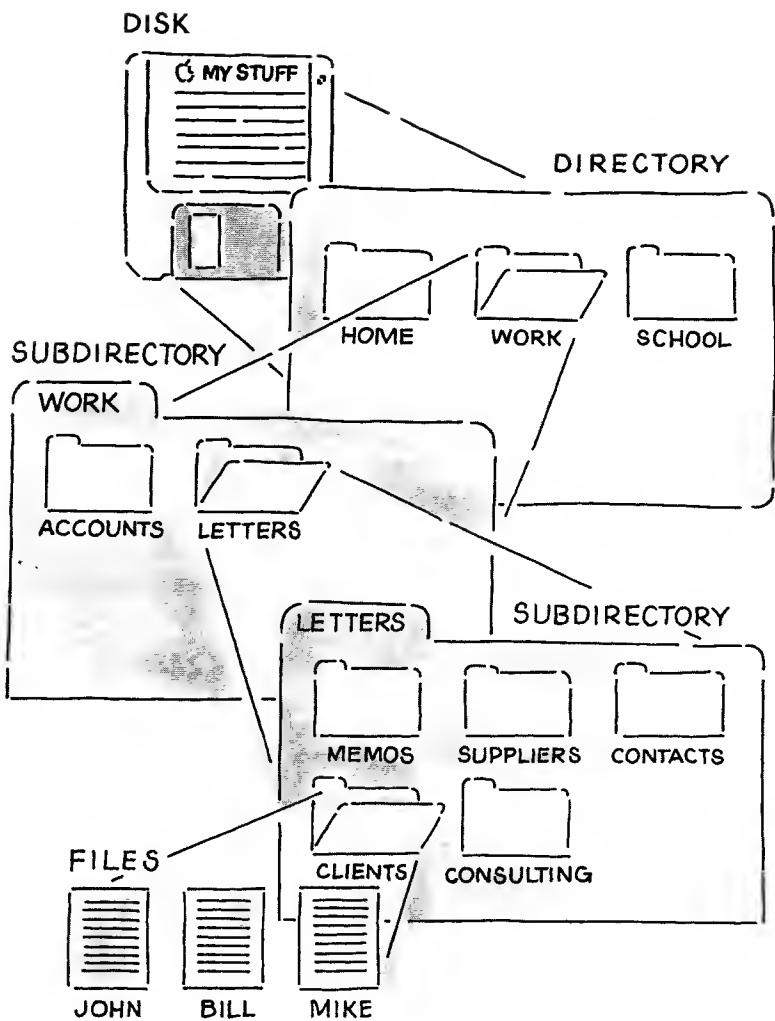


Figure 6-3
Putting a file in a subdirectory

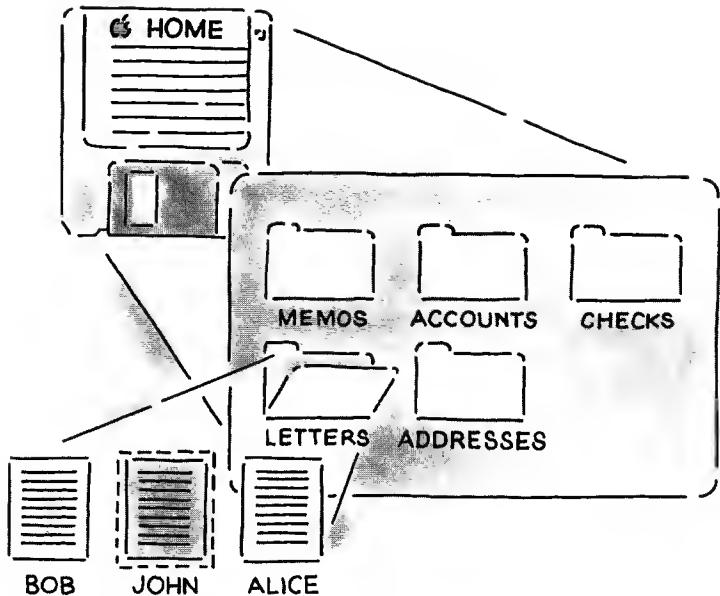
Once you've created a subdirectory, you can use the Copy Files option to move existing files into the subdirectory; if you are using a ProDOS-based application, you can also save any document you've been working on, using a pathname to place it into the subdirectory.

Setting a prefix

One of the ways to specify the location of a disk, subdirectory, or file is to provide the ProDOS pathname. The pathname is a sequence of names—the disk name, the subdirectory name if any, and the filename (if needed). Each part begins with a slash, like this: /TRYOUT/LETTERS/ALAN.

There are times when you need to go back to the same disk or subdirectory repeatedly. For instance, you might need to copy a dozen letters from several different disks into the LETTERS subdirectory on your backup disk. In such situations, you may find yourself typing the same parts of the same pathname over and over.

With the Set Prefix option, you can establish a shortcut to a particular disk or subdirectory so that you don't have to keep typing part of the pathname. For instance, you could set the prefix to be /TRYOUT/LETTERS. Then, whenever you choose to specify a location by ProDOS pathname, the utilities will present the name /TRYOUT/LETTERS/ already entered. All you need to do is press Return, and the files will be put in that subdirectory. On big jobs, this option can save you a lot of typing.



/HOME/LETTERS/JOHN

Figure 6-4
Setting a prefix

1. In the Main Menu, choose Set Prefix and press Return.
2. Choose the way you want to identify the location of the disk you're setting the prefix for—by physical location or by name; then specify its location.

For information on slots and drives, see "About System Utilities" in Chapter 1.

The utilities now provide you with the name of the disk and ask you to enter the full or partial pathname you want to use as a prefix to individual filenames.

3. If you just want a prefix that leads to a particular disk, edit the name and press Return, or accept the suggested name by pressing Return. If you want a prefix that leads to a subdirectory, add that part of the pathname and press Return. (See Figure 6-5.)

For instance, if you specify the disk in slot 5, drive 2, and that disk turns out to be TRYOUT, you can simply press Return if all you want is to return to that disk over and over. But if you want to return specifically to the subdirectory LETTERS on the disk, you add the subdirectory name, so that the prefix becomes /TRYOUT/LETTERS. Then you press Return.

Once you've set the prefix, you can choose the ProDOS pathname whenever asked to specify the location of a file you want to work with. The pathname will appear with the prefix already entered; all you need to do is press Return to accept it.

The prefix stays set until you change it or turn off the computer. You can always override it temporarily by editing it, so that you can go to another disk, subdirectory, or document. But the next time you need to specify a document's location, the computer will suggest the original prefix.

To change the prefix, follow the steps for setting a prefix and then edit it.

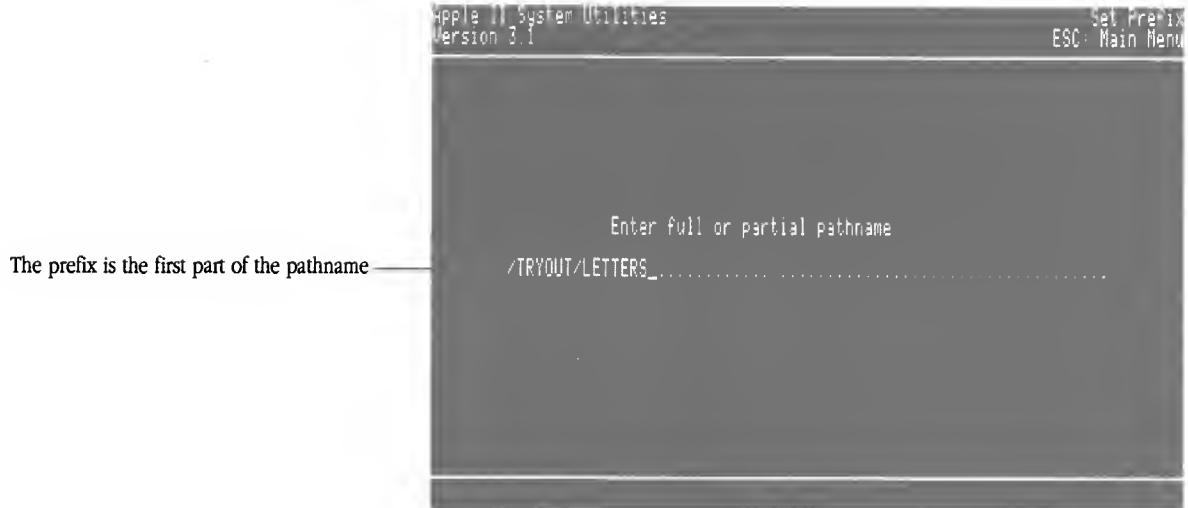


Figure 6-5
The Set Prefix screen

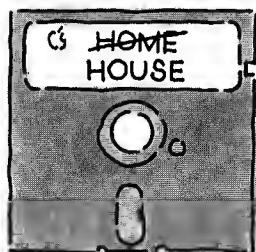


Figure 6-6
Renaming a ProDOS disk

Renaming a ProDOS disk

As you save more and more files on a disk, you may find that the disk's name no longer describes its contents. The Rename Volumes option lets you change the name of a disk without changing its contents. You can do this only with disks formatted with ProDOS.

1. In the Main Menu, choose **Rename Volumes** and press Return.
2. If you are using only one drive, replace the system disk with the disk whose name you want to change. If you have a second drive, put the disk to be renamed in that drive.

3. Confirm that you will identify the location of the disk by slot and drive; then specify its location.
4. Edit the disk's name. (See Figure 6-7.)

See "Naming Disks and Files" in Chapter 3 for a list of rules on naming a disk.



Figure 6-7
The Rename Volumes screen

Setting the Printer and Modem Ports on the Apple IIc and Apple IIc Plus

THE APPLE IIc AND APPLE IIc PLUS HAVE A ROW OF SOCKETS, KNOWN AS PORTS, on their back panels. Above one is an icon of a printer; this port is preset to work with the Apple ImageWriter®, the ImageWriter II, and many other standard printers. Above another port is an icon of a telephone; this is the modem port, and it is preset to work with an Apple modem and many similar modems. If your printer and modem work automatically with your Apple IIc, you don't need to change the port settings or read this chapter.

If you have another type of printer or modem, you may need to change the way these ports are set up to communicate with your peripheral device. If you need to connect a printer to the modem port, or vice versa, you will definitely need to change one or more settings. This chapter explains how to do so.

Once you have changed the serial port settings, they remain in effect until you turn off the computer. If you save your settings on the system disk, you don't need to return to the utilities to reset the ports. All you need to do is start up the system disk and then start your application by pressing Command-Control-Reset.

The information in this chapter applies only to the Apple IIc and Apple IIc Plus. If you have an Apple IIe, you can change the way your computer communicates with a peripheral device by changing switch settings on the device's interface card; please read the owner's manuals that came with the interface card and the device.

About ports

A **bit** is the smallest unit of information a computer can deal with; it's a yes or a no, an on or an off signal, a 0 or a 1. Usually eight bits (one byte) are enough to represent a single letter, number, or punctuation mark.

The ports on the back panel of the Apple IIc and Apple IIc Plus are designed to receive a cable from a peripheral device such as a mouse, a disk drive, a modem, or a printer. The printer and modem ports are **serial ports**—that is, each transmits and receives information one **bit** at a time. You can imagine the bits lined up in a series, waiting to travel down the line one after another.

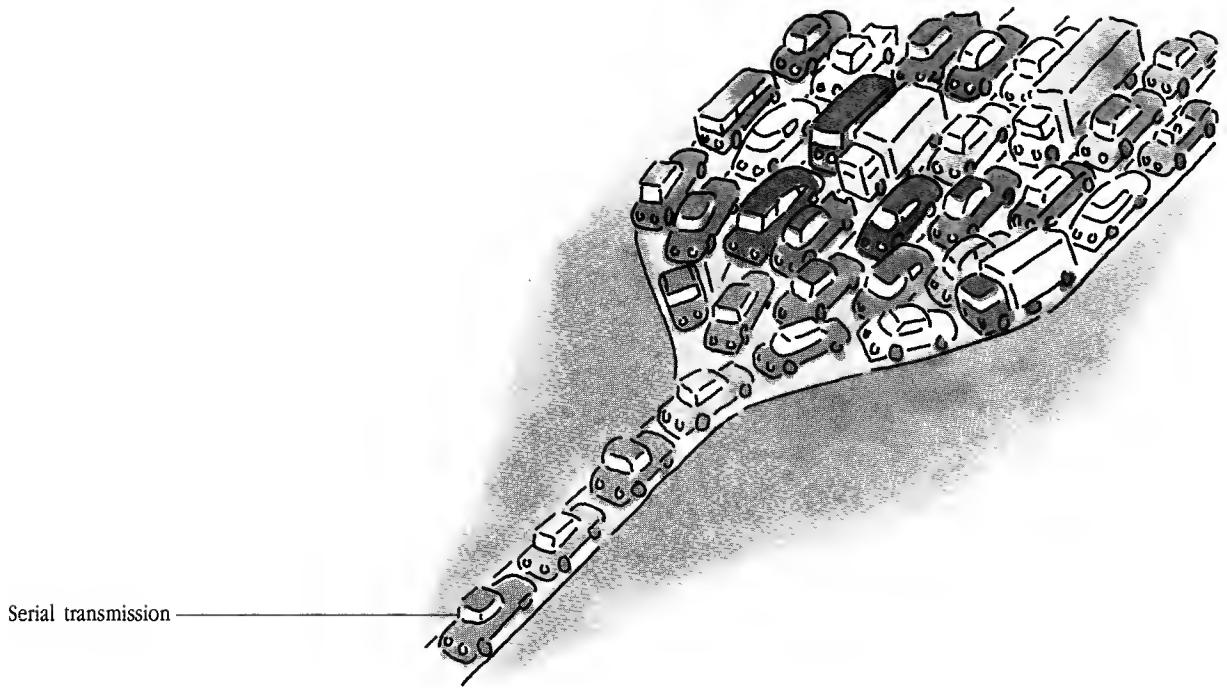


Figure 7-1
Serial data transmission

Most ports are set up to communicate information to a particular type of device, at one speed and in one format. But the modem and printer ports have been set up to allow you to connect a wide variety of devices, each with its own special requirements. If you have a non-Apple printer or modem, you may need to use the utilities to modify the settings on one of these ports to match the demands of the device. This is known as setting, or **configuring**, the ports.

An **information service** is an electronic library full of data you can reach via the telephone lines and display on your own computer. Some such services provide news, weather, stock prices, gossip, or scientific reports.

You don't need to change the setting of the printer port if you are using one of the ImageWriter series of printers, or one of many other popular serial printers that expects to receive data in the same way. If you're not sure whether your printer uses the standard settings, try printing. If it works, don't fix it. You can also check the user's manual for your printer and compare the specifications there with the standard port settings in Table 7-1.

For most commercial **information services**, you won't need to change the settings for the modem port. But if you're communicating with another personal computer, your modem—or the remote computer you want to "talk" to—may require a different setting to succeed in communicating back and forth. It doesn't matter which computer changes the settings as long as they wind up the same. Compare the specifications in your modem manual (or those provided by the operator of the remote computer) with the standard port settings shown in Table 7-1.

If you want to use your modem port for a printer or the printer port for a modem, you will need to use the utilities to reset those ports.

Letting your application do the job

Good news! Some applications automatically regulate the transfer of data to a peripheral device, overriding the current settings for a port. If the application presents you with a list of printers and asks you to choose yours from the list, you'll know that the application will send the document correctly set up for the printer you choose, ignoring the current setting of the port.

△ Important

Even if your printer is not on the list, try selecting each of the printers and then printing. Your printer may require the same serial port setting as one of the printers on the list. If your document comes out the way you expected it to, just keep selecting the appropriate printer each time you want to print. △

If the application asks you to supply details about how your printer or the remote computer needs to receive data (using terms such as *baud*, *data bits*, *stop bits*, and the like), you'll also know that the application will send the document using those settings and will ignore the current settings for your serial port.

- ❖ *By the way:* If you're not sure what settings your printer or modem requires, look in the user's manual for your printer or in the brochure you received when you subscribed to the information service. If you're puzzled by the various terms there, read the explanations in the following sections.

If an application does *not* give you a list of printers and does *not* ask for your printer's specifications, the document will be sent according to the current settings for the printer port. Similarly, if a telecommunications program does not ask for details about the settings needed to communicate with the remote computer, then your document will be sent with the current settings for the modem port.

Standard settings

Here are the standard settings for the printer port and the modem port. You can modify them now. The new settings will stay in place until you turn the computer's power off. The next time you turn the computer on, you will see the settings you saved.

The following sections explain what each setting does.

Table 7-1

Standard settings for the printer and modem ports

Function	Printer port	Modem port
Device connected	Printer	Modem
Line length	80 characters	Unlimited
Add LF after CR	Yes	No
Echo	No	No
Baud	9600	300
Data bits/stop bits	8/2	8/1
Parity	None	None
Handshaking	No	No

Before you change any settings

Try using your printer and modem before changing any of the settings. If it works, you've saved yourself some time. If it doesn't, the problems you notice (such as unintentional double-spacing, absence of carriage returns, lost characters, and so on) may help you figure out which settings need to be adjusted.

If you do need to reset one of the ports, get out the manual that came with your printer or the service you're trying to exchange information with, and look up the required setting for the individual functions.

Setting your ports

This section describes what each function does and how to adjust its setting.

1. **In the Main Menu, choose Set Serial Ports and press Return.**
2. **Choose either Set Printer Port or Set Modem Port; then press Return. You see the screen shown in Figure 7-2.**

Regardless of which port you are setting, you see the same list of functions; a check mark indicates that the function has been tuned to its standard setting.



Figure 7-2
The Set Printer Port screen

3. Press Up Arrow or Down Arrow to move the highlighting from one function to another, then press Left Arrow or Right Arrow to change the setting. Press Return when you finish changing settings.
4. Choose Save Port Settings and press Return.

Device connected

This setting tells the computer what kind of device you're connecting to this port. If you're connecting a printer or plotter to the port, select Printer. If you're connecting a modem to the port, select Modem.

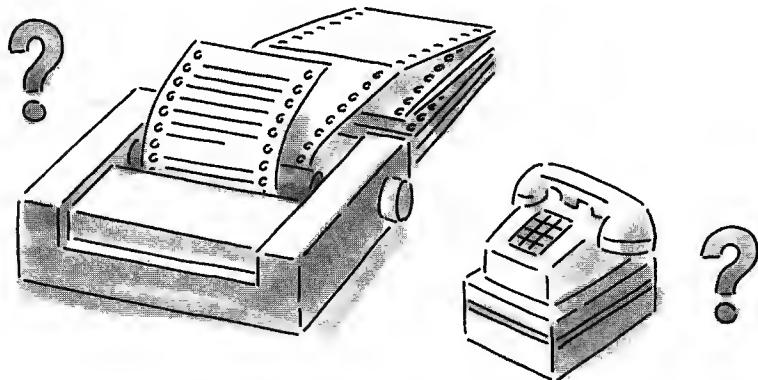


Figure 7-3
Device connected

Line length

This setting indicates the number of characters your printer should put in each line before generating a carriage return (sending the print head to the left margin to start printing again).

You can set the line length at 40 characters, 72 characters, 80 characters, 132 characters, or Unlimited.

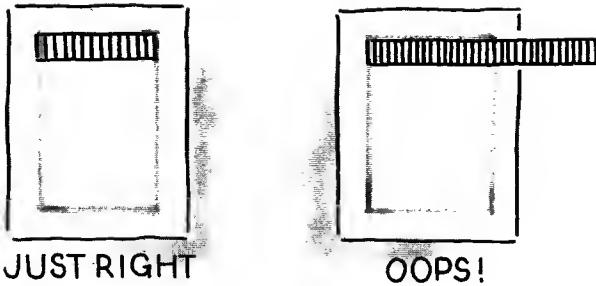


Figure 7-4

Printing with and without a carriage return

If the printer adds carriage returns where they don't belong, you should choose Unlimited. On the other hand, if the printer ignores the right margin and prints right off the page, you can use this option to insert a carriage return after every 40, 72, 80, or 132 characters. Experiment to see which setting is appropriate.

If you're connecting a modem, leave the line length set to Unlimited.

Add LF after CR

A carriage return (CR) takes the print head back to the beginning of the line; a line feed (LF) tells the printer to roll the paper up one line so you can begin printing the next line.

If your printer keeps printing everything on one line, that means it's not receiving any line feeds from your computer or your printer.

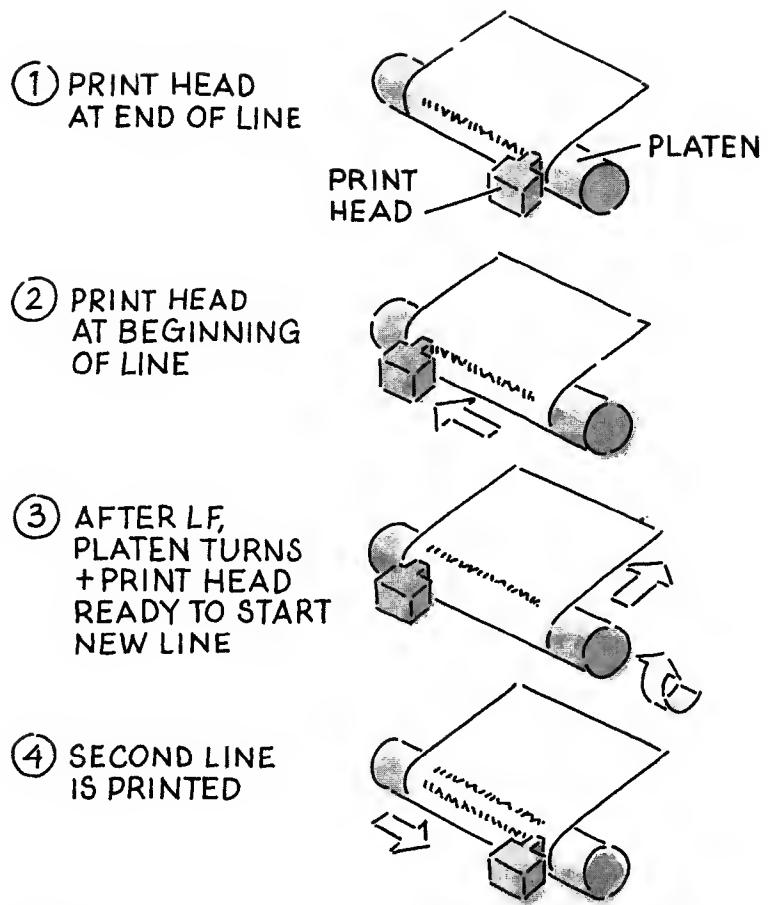


Figure 7-5
Line feeds

In that case, turn the automatic line feed switch on your printer to On. Or set this option to Yes so that the computer will add a line feed after each carriage return.

If the printer advances two lines after each carriage return, set this option to No.

Echo

When you send a message out through your modem or printer, you can choose to have the message displayed on your own screen as well as on the device it's being sent to. This is called **echoing**, and it's a convenient way to make sure that your message is being sent correctly. In most cases other than printing from BASIC, the language built into your computer, you won't need to use the Echo option because the computer you're sending the message to will probably send an echo of the message to your screen as a way of confirming that it received your message. If you choose the Echo option and the other computer sends an echo, you see double.

How do you know whether the remote computer will echo the message? A **full-duplex** modem can send a message at the same time it's receiving one; in general, such a modem sends back a confirming echo of each character it receives. Most information services use full-duplex modems. If you're communicating with a full-duplex modem, you don't need to have your own computer produce an echo as well, so set Echo to No.

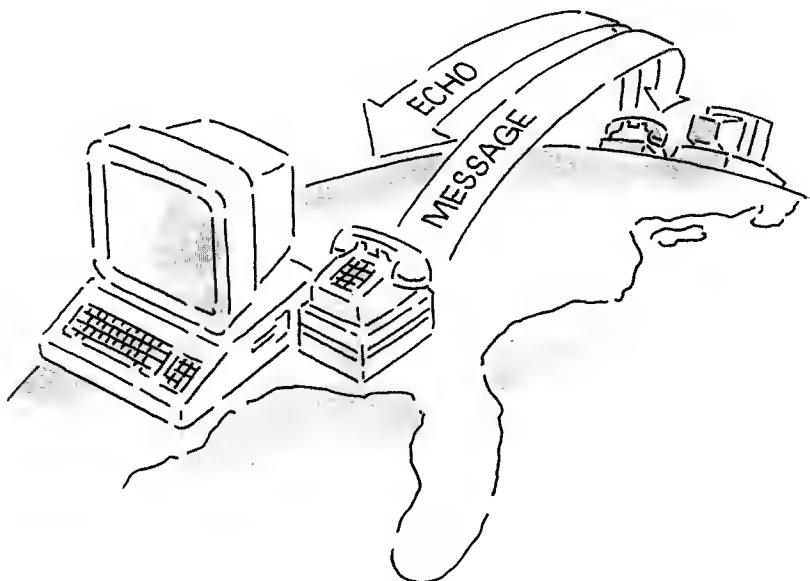


Figure 7-6

The remote computer sends an echo

A **half-duplex** modem can either send or receive but can't do both at once, so it is unable to echo your text back to you. If you're communicating with a half-duplex modem and you want your computer to display your message on the screen as it is sent, set Echo to Yes.

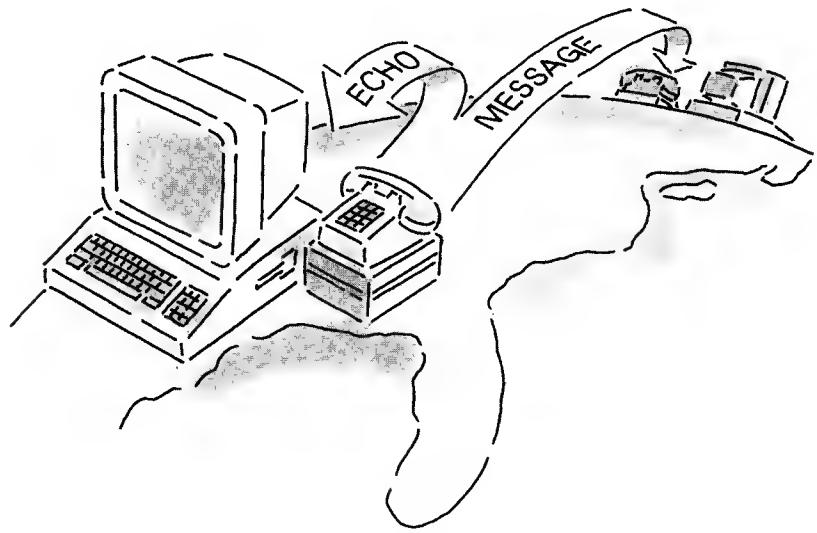


Figure 7-7
Your own computer sends an echo

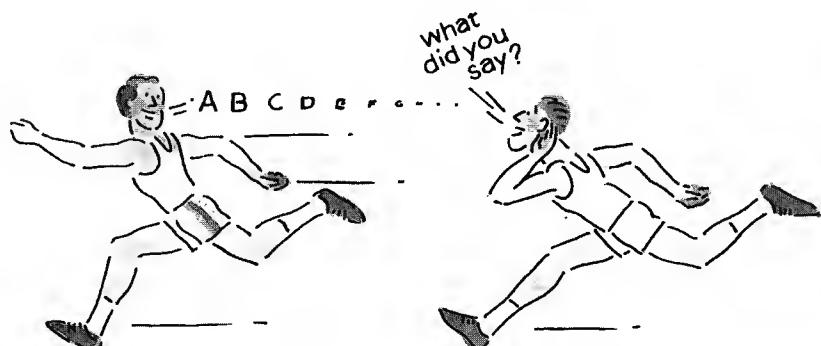
If you don't know what kind of modem is on the other end of the phone line, select Yes. If you then find that every character in your outgoing messages shows up twice, change the setting back to No.

Baud

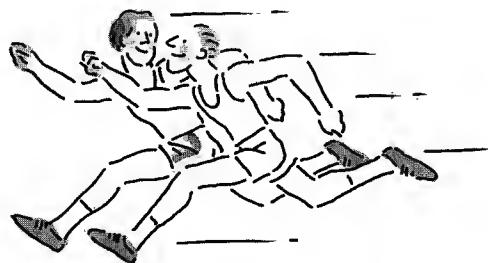
Your computer can send and receive information at many different speeds. It's important to make sure that the computer and the printer or modem agree in advance on the speed at which those bits of information will be traveling. Otherwise, something may get lost in the transmission.

Baud is the maximum number of bits a particular channel (such as a phone line) can communicate per second.

The rate of transmission is commonly referred to as **baud**. Usually a printer or modem has only a few settings at which it can receive information, so you must make the computer adapt to the device's preferred pace. Check the user's manual for the device, find out what speed is required, and then select the same speed for the computer here.



DIFFERENT BAUD RATES



SAME BAUD RATES

Figure 7-8
Baud

Over phone lines, most modems operate at 300 or 1200 baud; a few can manage 2400 baud. Any rates above that are usually limited to direct transmission between one computer and another, via cables. Choose the highest speed your transmission lines or remote computer can handle. With a printer that you connect directly to your computer, choose the highest speed at which the printer can receive data—usually 9600, occasionally 19,200. (The faster you send information to the printer, the quicker you can get back to work.)

Data bits and stop bits

The computer sends and receives each character of data as a string of bits. There are several systems for representing a character; some take five bits, some six, seven, or eight. These bits convey actual information and are known as **data bits**.

There are different ways of indicating that the string of bits that represents the character has ended; some systems require one bit, some two. These bits mark the completion of a character, so they are known as **stop bits**.



Figure 7-9
Stop bits

The manual that came with your printer or modem will indicate how many bits the device uses to represent a character (it's often 8) and how many bits the device uses to indicate that it has stopped sending one character and is about to send the next (it can be 1 or 2).

Parity

To make sure that your data isn't misinterpreted or garbled during transmission, some devices send one extra bit after every character, to test the integrity of the message. That bit is called the **parity** bit. The word *parity* derives from the Latin for *equal*, and parity checking is a way of making sure that your data bits add up to the same total at both ends of the line. What goes in should match what comes out at the other end. If it doesn't match, then the receiving computer asks the sender to retransmit or announces an error.

It's a match!

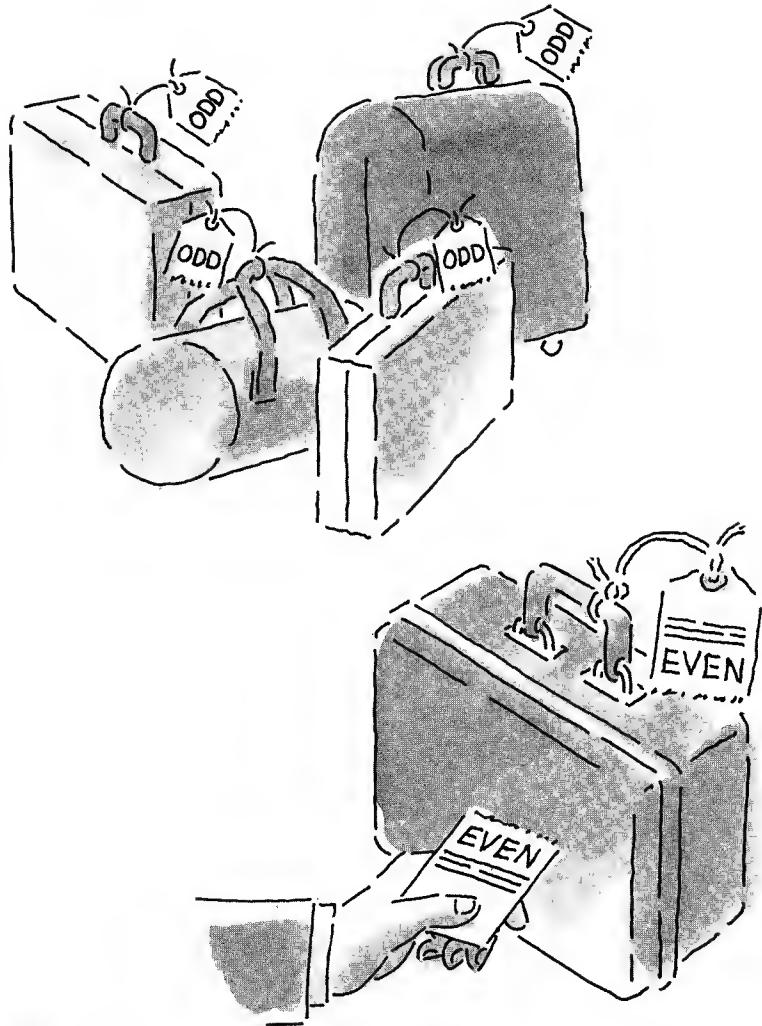


Figure 7-10
Parity checking

Most devices do not use parity checking, so if you're unsure about what to select, choose None.

If the device uses **odd parity** as a way of checking for errors, your computer must add an extra bit (either 0 or 1) to make the total of all the bits add up to an odd number. For example, in the American Standard Code for Information Interchange (ASCII), the 7-bit code for the letter *A* is 1000001; if you add up the 1's, you get a total of 2, an even number. The computer would add an extra 1 to make the total an odd number, transmitting 1000001+1. The receiving device adds up the 1's again. If the total is odd, chances are the message is OK; if it's even, there was an error in transmission.

If the device uses **even parity**, the computer adds an extra bit (either 0 or 1) to make the total of all bits (all the 0's plus all the 1's) an even number. The receiving device adds up the bits; if the total is an even number, the receiving device assumes that no error occurred.

More rarely used are mark parity and space parity. Check the brochure from the information service or the manual for the remote computer to see what type of parity, if any, you should set.

Handshaking

When your computer begins to communicate with a peripheral device, it sends a signal saying, in effect, "I'm about to send you some information." And the device responds with a signal saying, in effect, "I'm ready when you are" or "Give me a second to catch my breath." These exchanges are called **handshaking signals**.



Figure 7-11
Synchronized transmission

If necessary, you can choose the XON/XOFF handshake here. **XON** and **XOFF** are ASCII characters. XOFF tells the sender to halt transmission of characters. XON tells the sender to resume transmission of characters. Don't change this setting unless the manual that came with your device specifically tells you to set it to XON/XOFF.

Saving your settings

When you have set the functions, press Return and choose Save Port Settings from the Set Serial Ports screen. This saves your settings on the system disk and establishes them for as long as your computer is on.

Turning off the computer erases these settings from memory, but they are saved on the system disk. The next time you start up the system disk, your settings will be loaded into memory and you'll be able to communicate with your printer and modem. Start up the next application by pressing Command-Control-Reset, and your port settings will remain in effect.

Working With a Memory Expansion Card

THE APPLE II MEMORY EXPANSION CARD ADDS EXTRA RANDOM-ACCESS MEMORY (RAM) to your computer. The standard memory expansion card comes with 256K of RAM, but that amount can be expanded to 512K, 768K, or 1 megabyte.

Why expand memory?

Expanded memory offers you these benefits:

- You can store files on the card temporarily. The application does not have to take the time to retrieve them from a disk drive, so you get faster access to different parts of your documents and to different documents.
- You can copy some applications onto the card. A large application is usually designed to place part of the program in memory and then load other parts in and out of memory as needed. When you place the entire application on the card, you get faster processing because the computer never needs to go out to the program disk to fetch more of the application. You'll learn more about this process in "Running Applications From the RAM Disk" later in this chapter.
- Some large and sophisticated programs such as AppleWorks 2.0 load themselves onto the card automatically and run from there.

This chapter gives a little background on the memory expansion card, then shows you how to verify that the card is readable, how to store files on it temporarily, and how to set it up so you can run applications from it.

How memory expansion works

The memory expansion card functions like a cross between a disk and an area of internal memory. The card is like other parts of internal memory in that data can be stored there and retrieved very quickly and anything stored there will be lost when you turn off the power.

That's the biggest difference between the memory expansion card and a regular disk. When you shut down your computer, the memory expansion card loses its memory. Any documents you left there are gone permanently.

Like a disk, the memory expansion card

- has a volume name after it has been formatted
- has a location you can specify: usually slot 4, drive 1
- can store an application and documents (but only as long as the power is on)

Because it combines characteristics of RAM and of disks, the memory expansion card is often known as a **RAM disk**.

△ **Important** If you save a document to the memory expansion card, be sure to save another copy to a regular disk before you leave your application, or use your utilities to copy the file from the card to a regular disk *before you turn off the computer*. When you switch off the power, the memory expansion card forgets whatever it knew. △

If you are just going to use the memory expansion card with application programs that automatically take advantage of the extra memory on the card, and you don't plan to save any documents to the card, you don't need to know anything else about it. You can stop reading right here. But to take full advantage of the memory expansion card on the Apple IIC, the Apple IIC Plus, and the Apple IIe, read on.

△ **Important** The Apple IIC memory expansion card is not designed to be used with the Apple IIC Plus. Ask your authorized Apple dealer to recommend a compatible card. △

Working with the utilities

The utilities can work with the memory expansion card as if it were an ordinary disk, verifying that it is functioning well and can be read, formatting it, providing you with a list of the files it holds, and listing it with any other formatted disks in drives connected to your computer.

The utilities can handle files on the memory expansion card as they would files on any other disk, copying files onto the memory expansion card or from it onto another disk, deleting a file on the card, renaming a file on the card, and locking or unlocking a file on the card.

When formatting a disk, the utilities prepare areas for data, known as **boot blocks**. The boot blocks tell the computer that the disk contains an application that can be started. (*Boot* describes what the computer does when you turn the power on. It loads a small program into memory, and that program loads your application. In this way, the computer pulls itself up by its own bootstraps.)

And when the card has been formatted using ProDOS, you can use the utilities for creating a subdirectory on the card, setting up a prefix leading to the card or to a subdirectory on the card, and renaming the card.

When you put an application disk in the startup drive and turn on the power, the RAM disk is *automatically* formatted with the same operating system the application uses. You can then save files to the RAM disk from the application without having to format the RAM disk.

But if you want to run an application from the card and that application does not automatically load itself onto the RAM disk, *you* must use the utilities to format the RAM disk with the correct operating system. This process lays down **boot blocks** telling the computer to look here for an application to start.

Verifying that the RAM disk is readable

You can use the utilities to make sure the RAM disk is readable. In the Main Menu, choose Verify a Disk. If this disk is good, you see the message "No errors." If there are any problems, you see a message describing them. Before running this test, be sure you have a card installed, or the results will be meaningless.

If you want a more elaborate diagnostic test, follow these steps:

1. Start your computer without a disk in the startup drive.
2. Press Control-Reset.
3. Type `CALL -151` and press Return.
4. Type `C40AG` (use a zero, not the letter O) and press Return.

(The 4 here stands for the slot number; on an Apple IIe, if your RAM disk is in a slot other than 4, use that slot number in place of 4.)

During the memory card test, you will see an indication of how long the test will take (it depends how big the card is), and growing rows of dots (showing that the testing is still going on). At the conclusion of the test, you'll see either the message "Card OK" or the message "Card failed." If the card fails, make a note of the error number that appears on the screen and take your card and computer to your authorized Apple dealer. When the test is complete, put an application disk in your startup drive and press Command-Control-Reset to start.

Storing files temporarily on the RAM disk

After starting a ProDOS-based or Pascal 1.3-based application, you can save that application's files (and any other files based on that operating system) on the RAM disk. You don't have to format the RAM disk for this purpose; it formats itself when you turn the power on.

This formatting allows the RAM disk to store files from your program. From your application, you simply save a ProDOS document to /RAM4, and a Pascal 1.3 document to RAM4. (The RAM disk is named that because it acts as if it were in slot 4, drive 1; on an Apple IIe, if you have placed the RAM disk in some other slot, use that slot number instead of 4.)

For a ProDOS application, you can create subdirectories on the RAM disk and save files into those subdirectories. For instance, if you create the subdirectory BUDGETS on RAM4, you would save the file APRIL to /RAM4/BUDGETS/APRIL.

But remember that these files disappear as soon as you turn the power off. Before leaving an application, make sure that you save each of these files to a real disk for permanent storage.

Running applications from the RAM disk

You can run a ProDOS-based or Pascal 1.3-based application from your RAM disk to achieve faster processing. A large and sophisticated application may be designed to conserve space in your computer by leaving certain parts of the program (known as *modules*) out on the disk, to be called into memory only when needed. Retrieving anything from the disk takes a lot longer than retrieving it from memory. By copying the entire program onto the memory expansion card, you never have to wait for the program to go out to the program disk for another module.

Some current software looks for the memory expansion card and, finding room there and seeing that the card has already been formatted by its own operating system, loads the application into the RAM disk automatically. For instance, AppleWorks 2.0 loads itself entirely onto the memory expansion card and takes any remaining memory for its working space, known as the *desktop*. With a program like this, you don't have to copy the application yourself; the application does all the work.

With applications that do not know to look for a memory expansion card, you need to do the work yourself. There are three main steps:

1. Use the utilities to format the RAM disk.
2. Copy the application onto the RAM disk.
3. Start the application from the RAM disk.

The following sections explain these steps in detail.

Formatting the RAM disk

If you want to run a ProDOS application that does not load itself onto the memory expansion card, you need to use the utilities to format the card first. You must format the card each time you power up, to be able to run applications from the card; this formatting adds boot blocks, which signal the computer that the card may contain an application that can be started (booted).

❖ *To run Pascal applications:* You must format the memory expansion card with the Pascal Filer before loading and running Pascal applications. To store data on the memory expansion card, simply put a Pascal disk in the startup drive, turn the power on, and save files to the card.

1. Put the system disk in the startup drive and turn on the computer.
2. Press Return to choose System Utilities.
3. In the Main Menu, choose Format a Disk.
4. Specify the location of your memory expansion card; on the Apple IIc, the location is slot 4, drive 1.
5. Choose the operating system your application requires.
6. Name the RAM disk: if you are using ProDOS, call it /RAM4. If you are using Pascal 1.3, call it RAM4.
7. Press Return. (Your memory expansion card is already in place.)
8. You will see a message asking whether it's OK to erase all data contained on the card. (You'll see this message whether or not you've saved anything to the card.) Choose Yes if you are willing to erase the data contained on the card. If you have any doubts, choose No, press Esc to return to the Main Menu, and choose Catalog a Disk to see what's still on the disk.

You're now ready to copy the application onto your formatted RAM disk, so you can run the application from there.

Copying applications onto the RAM disk

You use one procedure for copying your first application onto the memory expansion card, and a slight variation for any other applications you want to add.

Copying the first application

1. In the Main Menu, choose Copy Files.
2. Specify how you want to give the location of your application disk.

If you want to identify your application by its ProDOS pathname, you may. The volume name of both the startup disk and the program disk for earlier versions of AppleWorks is /APPLEWORKS. The volume name of the program disk for Apple Writer™ II is /AW2MASTER. The volume name of the program disk for Apple Access II is /ACS. If you want to find the volume name of your application, use Catalog a Disk.

3. Specify the location of the application disk. Make sure the disk is in that location.
4. Specify the location of your RAM disk: on the Apple IIc and Apple IIc Plus, it is in slot 4, drive 1.
5. Select all the files on your application disk.

As each file is copied from the program disk to the memory expansion card, you see a message like this on your screen: "Copying PRODOS... Done!"

If your application program has more than one disk, follow this procedure for both the startup disk and the program disk.

You may have to wait a while when copying a large and complex program. For instance, there are over forty files on the *Apple Writer II Master* disk. Please be patient.

Occasionally a program disk will contain a subdirectory. The utilities will create the subdirectory, then copy all the files it contains.

Copying other applications

You copy any other applications the same way you did the first one, with a few minor variations.

Each application brings a copy of its operating system along with it. You should have only one copy of the operating system on your memory expansion card. When you tell the utilities to copy all the files on your new application's disk, you'll get a message asking if you want to delete the existing ProDOS or Pascal (to replace it with the one from your new application disk). Just choose No. The utilities will cancel the operation, and report something like "Copying PRODOS... Canceled!" Don't worry. This message just means you haven't copied over the existing version of your operating system.

Look carefully at the names of each application's files. If two or more of these applications have system files with identical names (the filenames of system files end in .SYSTEM), you'll need to create separate subdirectories before you copy the two applications onto the memory expansion card. You may also need to reset the prefix to that subdirectory later, so that the application can find all the files it needs to start up.

Another good reason to put applications in subdirectories on your memory expansion card is that there is a limit to the number of files you can fit into a ProDOS directory. (The limit is 51.) With programs that have lots of files (such as Apple Writer II), you could run out of room in the main directory long before you run out of memory on the card.

Starting an application

Once you've copied the application or applications onto the RAM disk, remember not to start the application by turning off the computer and turning it back on. (Turning off the power erases the information on the RAM disk.) If you have only one application on the memory expansion card, you can start it just by pressing Command-Control-Reset.

If you have two or more applications on the memory expansion card, you need a way to tell the computer which one to start. First, you quit the utilities; then you type a prefix and a pathname to run the application. Here's how:

1. From anywhere in the utilities, press Esc to return to the Main Menu.
2. Choose Quit from the System Utilities menu.
3. Choose Quit from the System Disk menu.
4. When asked for the prefix, type the volume name of your RAM disk, followed by a slash.

For instance, if your memory expansion card has been formatted with the name /RAM4, you would type /RAM4/. If your program is in a subdirectory on the memory expansion card, you must add the subdirectory name as well; for instance, if you had AppleWorks in a subdirectory AW, you would type /RAM4/AW/.

5. When prompted for the pathname of the next program you want to use, provide the name of the system file (it usually ends in .SYSTEM).

For instance, with only AppleWorks on a ProDOS-formatted RAM disk called /RAM4, you would type APLWORKS.SYSTEM. With only Access II on the disk, you would type LOADER.SYSTEM.

If you can't recall the name of the system file for your application after having set the prefix, remove any other disks from your disk drives, then press Command-Control-Reset. The computer will look in each drive for an application to start up and, using the prefix you set up, will find the application on the memory expansion card and start that application.

To return to the utilities, quit the program you're using, make sure the system disk is in a drive, then type or accept /UTILITIES/ when asked for a prefix and PRODOS when asked for the pathname. (The whole pathname is /UTILITIES/PRODOS, but here you provide it in two stages, so that the computer will know where to find the other files needed by PRODOS.)

Troubleshooting

MAKING MISTAKES IS PART OF THE LEARNING PROCESS. IN FACT, IF YOU DON'T make a few mistakes, you're probably not being very adventurous. If you hear a beep and see a message you don't understand, find the message in this alphabetical list and follow the troubleshooting tips.

■ An attempt to read or write data on a disk was unsuccessful

Make sure a correctly formatted disk is in the drive. With a 5.25-inch drive, close the drive door. Tighten all connections between drives and the computer. To make sure the disk itself is readable, choose Verify a Disk. If you specified a slot and drive, make sure those numbers are correct. (See “About System Utilities” in Chapter 1.)

■ An error occurred

Perhaps you entered a filename at the end of the pathname. For some operations, that’s going too far. The prefix should lead to a volume (the disk) or a subdirectory full of other files—not to a particular file. Press Return, then delete the filename at the end of the pathname.

You may also have entered the volume name or subdirectory name incorrectly. If you have any doubts about the spelling of either name, press Return, then press Esc and choose Catalog a Disk to check.

■ Beep!

You’ve tried to do something that the application does not allow. For instance, in typing a pathname, you’ve tried to use some character other than a letter, number, or period. Or in naming a file, you’ve tried to use too many characters. The application prevents you from making the mistake and warns you with a beep.

■ Delete files in the subdirectory?

If you intend to delete every file within the named subdirectory, choose Yes. To preserve the files within that subdirectory, choose No.

■ Different volume sizes

As a safety precaution, the Duplicate a Disk option does not even begin to format the new disk if it’s a different size from the original. (To do so would shrink an 800K disk to 143K, or risk trying to put 800K of files onto a 143K disk, thereby losing or damaging data.) If you want to copy data among disks of different sizes, use the Copy Files option to copy individual files instead of a complete volume.

■ **Disk is full**

You've run out of room on the disk. To squeeze any more files onto the disk, you must delete one or more of the files now on the disk. Use Catalog a Disk to find out how much room is left and how much space each file takes up, then use Delete Files to remove as many files as necessary. If you do not want to delete any files, put the new file on another disk.

■ **Disk is write-protected**

Make sure you have the correct disk in the drive.

Before overriding the write-protection on a disk, decide whether you really want to allow changes to be made to these files. (You may have had a good reason to protect them.) To remove protection on a 5.25-inch disk, remove the adhesive write-protect label and reinsert the disk. To remove protection on a 3.5-inch disk, slide the write-protect tab to close the square opening in the corner of the disk.

■ **Duplicate file or subdirectory name**

To avoid confusion, the utilities will not let you put two files with the same name on the same disk or subdirectory. (You can put files with the same name into two different subdirectories on the same disk if you wish.) You have three choices in this case: give this file a new name, put it on another disk, or put it into another subdirectory.

■ **Duplicate volume names**

Change the name of one disk, using Rename Volumes. Then you can copy the files. (The utilities use the volume names as a way of distinguishing the source disk from the destination disk.)

■ **Error code = xx**

Unanticipated error. Write down the error number and consult your authorized Apple dealer.

■ **File is locked, delete it?**

You once wanted to protect this document from changes. The warning gives you a chance to preserve it. If you realize you want to preserve the file after all, choose No. If not, choose Yes.

■ File is locked, rename it?

You once wanted to protect this document from changes. The warning gives you a chance to save its name. If you realize that you want to preserve the name after all, choose No. If not, choose Yes.

■ File or subdirectory not found

Make sure you have the correct disk in the disk drive.

Use Catalog a Disk to check the spelling of the volume name and any subdirectory or filename.

■ File X already exists, delete it?

In copying this file, the utilities have found a file with the same name on the destination disk. If you want the copy from your source disk to replace the version on your destination disk, choose Yes. If you don't want to lose the version on your destination disk, choose No.

■ Incorrect disk format

You've tried to create a subdirectory, set a prefix, or rename a volume with a disk that has not been formatted with ProDOS. If the disk contains valuable data, you should *stop the operation* now.

If you don't mind erasing the contents of the disk, you can format it with ProDOS and then proceed.

■ Incorrect pathname

Begin with a slash, then type the disk name, another slash, and, if needed, the name of the subdirectory. The first character of the disk name or subdirectory name must be a letter. A ProDOS filename can be no longer than 15 characters.

Make sure that you have not tried to use the Rename a File option to move this file onto another disk. (Use Copy Files for that purpose.) Renaming must leave the file where it is, changing only the name.

■ Slot and drive numbers...

See "About System Utilities" in Chapter 1.

■ Volume directory full

The disk may not be full yet, but you have tried to use more than the maximum of 51 filenames per directory. You can copy some files to another disk and then delete their originals here; you might also want to create a few subdirectories and copy some files into them. Either way, you will have fewer names on the volume directory and more room for new files.

■ Volume not found

Make sure that you typed the disk name correctly and that the disk is securely placed in the drive. If you are using a 5.25-inch disk, be sure to close the drive door. If you think you may have forgotten the disk name, choose List Volumes or Catalog a Disk.

Glossary

Apple II: This is a whole family of computers, including the original Apple II, the Apple II Plus, the Apple IIe, the Apple IIc, the Apple IIc Plus, and the Apple IIGS®. The utilities are designed to run on the Apple IIe, the Apple IIc, and the Apple IIc Plus, but they can handle files created on other Apple II computers using DOS 3.3, ProDOS, and Pascal 1.3.

application: A program that puts the resources of the computer to use for some specific purpose, such as word processing.

ASCII: Acronym for the American Standard Code for Information Interchange. A code in which the numbers from 0 to 127 stand for text characters and punctuation. This code is used for transmitting text from your computer to a printer or, through a modem, to another computer.

back up: To make a spare copy of a disk or file, to ensure that you won't lose information if the original is lost or damaged.

backup copy: An extra copy of an application or file, made as insurance against any disasters that might befall the original.

based: When an application relies on an operating system to send and receive information from disks and to perform other chores, that application is *based* on the operating system. For instance, AppleWorks is ProDOS-based.

BASIC: A programming language built into the Apple II. The system disk contains extensions of BASIC that let you save and load BASIC programs on disks formatted with the ProDOS operating system.

baud: The maximum speed at which data can be sent down a channel, such as a telephone line; often confused with the actual speed at which the data is transmitted between two computers, measured in bits per second.

binary code: A number system that uses only 0 and 1 as digits. Because computers can keep track of only two states (on or off), engineers code data in terms of 0's and 1's.

bit: A binary digit (0 or 1); the smallest possible unit of information, such as yes or no, on or off, positive or negative.

blank disk: A disk that has not been formatted to receive information and therefore has no files on it.

block: A unit of information 512 bytes (roughly 512 characters) long. When you choose Catalog a Disk, you see a directory that reports the sizes of disks and files in blocks.

boot: To start the computer or an application by loading a program into memory from an external storage medium such as a disk. Often accomplished by first loading a small program whose purpose is to read the larger program into memory. The program is said to *pull itself up by its own bootstraps*.

boot blocks: An area on a formatted disk that signals the computer that the disk contains an application to be started up.

byte: A unit of information consisting of a series of eight bits. One byte can represent a letter, number, punctuation mark, or other character.

card: A printed-circuit board that plugs into one of the computer's expansion slots, allowing the computer to use one or more peripheral devices such as disk drives.

carriage return: An ASCII character that ordinarily causes a printer or display to place the next character on the left margin. A carriage return does not move the print head or cursor down to the next line.

catalog: To list all files stored on a disk.

central processing unit (CPU): The "brain" of the computer; the microprocessor that performs the actual computations.

character: A symbol such as a letter, number, or punctuation mark.

circuit board: A board containing embedded electronic circuits and an attached collection of integrated circuits (chips). One type of circuit board, placed in a slot in an Apple IIe, controls the flow of information between the disk drive and the central processing unit (CPU) of the computer.

command: A communication from you to the computer, telling it to perform some immediate action.

configuring: Setting the serial ports of your computer to communicate with a particular printer, modem, or remote computer using the speed and format that the device requires.

copy: To duplicate a document or disk. The utilities can make copies for you.

CR: Abbreviation for **carriage return**.

cursor: The blinking marker that indicates where what you type will appear.

data bits: In the stream of bits being sent from your computer to a peripheral device or another computer, the bits that contain meaningful information; distinguished from bits used to indicate that a character is about to start, has stopped, or is correct.

default: A preset response to a question or prompt; usually the expected or most common response. Default values prevent a program from stalling if you do not enter a value.

delete: To remove a file from a disk, leaving space available for other files. When editing, to erase one or more characters.

destination: When you're making a copy of a file or disk, the destination volume is the volume onto which you are copying; distinguished from the **source** volume, from which you copy.

device: A physical apparatus for performing a particular task—for instance, a disk drive, a monitor, or a keyboard.

directory: A list of the contents of a subdirectory or disk. Contains the names, sizes, and types of each file.

disk: A flat, circular, magnetic surface, serving as a medium for storing information. A **RAM disk** is memory that functions as a cross between internal memory (RAM) and a disk.

disk operating system: Software that enables your computer to communicate with its disk drives.

document: A named collection of meaningful data, created by an application program and stored on a disk as a file.

DOS 3.3: An early disk operating system for Apple II computers. The utilities can handle disks and files formatted with DOS 3.3.

drive: A device that reads and writes information on a disk.

duplicate: To copy the contents of one disk onto another.

echo: To send each character of your message back to your monitor so you know it's been sent to another computer or to a printer.

Esc: Short for **Escape**. Pressing the Esc key cancels an operation and returns you to the Main Menu of the utilities.

even parity: When transmitting a character in binary code (a string of 1's and 0's), the use of an extra bit set to 0 or 1 to make the total number of 1 bits an even number; used as a means of checking for errors when sending data from your computer to a peripheral device or to another computer.

external drive: Any disk drive attached to the computer through a port or slot; distinguished from a built-in drive in the Apple IIc and Apple IIc Plus.

file: A named collection of information stored on a disk. A document, a subdirectory holding several documents, a small application program—each is a file.

5.25-inch disk: A flexible plastic disk, 5.25 inches in diameter, with a thin, flexible plastic jacket.

floppy disk: A disk made of flexible plastic, as compared to a hard disk, which is made of rigid material, usually metal.

folder: A file that can hold lots of other files, along with a list of those files; known as a **subdirectory**.

format: To prepare a disk to store information. You must format a blank disk before you can save documents on it. Same as **initialize**.

full duplex: A way of communicating between your computer and another computer or device, in which signals are sent and received at the same time. This allows the receiving device to echo back each character of your message as it is received.

half duplex: A way of communicating between your computer and another computer or a peripheral device, in which you can only send data or receive it at one time—not both. The other computer cannot echo back each character of your message as it is received.

handshaking: Establishing communication with a peripheral device or another computer.

hard disk: A disk made of metal and sealed into a drive or cartridge. A hard disk can store very large amounts of information compared to a 5.25-inch or a 3.5-inch disk.

highlight: To move the bright bar over an option, indicating that you want to select it.

information service: A provider of electronic information. From your desk, your computer can communicate through a modem, across telephone lines, with these services, bringing back news, stock prices, and a wide range of other data.

initialize: To prepare a disk to receive information. You must initialize a blank disk before you can save documents on it. Same as **format**.

interface card: A card that handles the interface (or connection) between the computer and a particular peripheral device, such as a printer, a disk drive, or a modem.

kilobyte (K): Two to the tenth power (1024) bytes (from the Greek root *kilo*, meaning one thousand); for example, 128K of memory equals 128 times 1024 bytes, or 131,072 bytes.

line feed: An ASCII character that causes a printer or display device to advance to the next line.

line length: The number of characters your printer or video display should put on each line before going on to the next line.

list: To display the contents of the disk directory on your screen or on paper.

lock: To prevent a file from being renamed, replaced, or removed. Compare **unlock**.

megabyte (MB): Two to the twentieth power (1,048,576) bytes (from the Greek root *mega*, meaning million). One megabyte equals 1024 kilobytes.

memory: A hardware component of the computer; memory holds information temporarily for later retrieval.

memory expansion card: A circuit board that adds extra random-access memory (RAM) to your computer; the card comes with 256K of RAM, but can be expanded to 512K, 768K, or 1 megabyte. Also known as a **RAM disk**. Like a disk, it must be formatted with a particular disk operating system to store data. Unlike a disk, it acts like the random-access memory inside the computer, so that any data or program you put on the card can be read and used almost immediately, without making you wait while data comes in from a disk in an external disk drive.

menu: A list of choices presented by an application, from which you can select an action.

modem: Short for **modulator/demodulator**. A peripheral device that links your computer to other computers and information services over telephone lines.

modem port: The socket on the back of the Apple IIC and Apple IIC Plus marked by a telephone icon. This is a serial port: data moves through it one bit at a time, following conventions you can establish with the utilities.

odd parity: When transmitting a character in binary code (as a string of 1's and 0's), the use of an extra bit set to 0 or 1 as necessary to make the total number of 1 bits an odd number, used as a means of checking for errors when you are sending or receiving data.

open: To retrieve an existing file from a disk, bringing the information back into the computer, usually for display on your screen, where you can read it and revise it.

operating system: Software that organizes the actions of the parts of the computer and communicates with peripheral devices such as disk drives.

parallel interface: A way of transmitting a byte of information, in which 8 bits are sent over 8 different wires simultaneously.

parity: The sameness of level or count, usually the count of 1 bits in each character, used to check for errors when you are sending or receiving data.

partial pathname: The portion of the pathname following the prefix. The prefix provides the volume name, and the name of the subdirectory if needed; you provide the rest of the pathname leading to a particular file.

Pascal: An operating system and a programming language. Your utilities work with the Pascal operating system, version 1.3.

pathname: The full name by which an operating system locates and identifies a file. The pathname specifies the path from the disk, through any subdirectories, to the file itself. Each part is preceded by a slash.

peripheral device: Any physical apparatus for performing a particular task outside the main circuit board; thought of as at the *periphery* of the computer. Examples: a disk drive, a monitor, a printer.

port: A socket on the back panel of the Apple IIC and Apple IIC Plus into which you can plug a cable to connect a peripheral device.

prefix: A stored pathname that is put in front of any subdirectory name or filename you provide.

printer port: A socket into which you can plug a printer. This is a serial port, in which bits of information are sent one after another in a series. With the Apple IIC and Apple IIC Plus, you can use the utilities to set the speed and formatting of this data.

ProDOS: An acronym for **Professional Disk Operating System**; an Apple II operating system designed to support subdirectories and large-capacity disks.

program: A set of instructions conforming to the rules and conventions of a particular programming language, telling the computer to perform a series of actions designed to accomplish a task such as word processing. A program relies on the operating system to move data back and forth between the computer and the disks.

RAM: An acronym for random-access memory. Computer memory that can be read from or written to in any order; the contents of individual locations can be referred to in a nonsequential or random order. Your application program and its data are stored in RAM while you work. When you turn off the power, all information is erased from RAM. That's why you should save your documents regularly to a disk, a storage medium that preserves your information even after you turn off the power.

RAM disk: A memory expansion card, used as a temporary storage area for data. Like a disk, it must be formatted with a particular disk operating system to store data. Unlike a disk, it acts like the random-access memory inside the computer, so that any data or program you put on the RAM disk can be read and used almost immediately, without making you wait while data comes in from a disk in an external disk drive.

read: To transfer information into the computer's memory from a disk. You can use the utilities to verify that a disk is readable.

remote computer: Another computer in communication with yours—perhaps through telephone lines. A remote computer can be at any distance from your computer, from right beside it to thousands of miles away.

rename: To give a new name to a file or disk; the Rename Files and Rename Disks options do this without changing the contents of the file or disk.

save: To preserve a document by storing it on a disk.

serial port: The connector for a peripheral device that uses data transmitted sequentially, one bit at a time, over a single wire or channel. Examples: the modem port and the printer port on the Apple IIC and Apple IIC Plus. You can use the utilities to set the speed and format of data sent through these ports, to communicate with a particular device.

slot: A narrow socket inside some models of the Apple II, for connecting circuit boards known as **interface cards**; each card handles communication between the computer and a peripheral device, sending and receiving data through a port, or plug, on the outside of the computer.

source: The original volume. When you are making a copy of a file or a volume, the source volume is the volume you are copying from; the **destination** volume is the disk you're placing the copy on.

start: To launch an application program. Note that some application programs come on two disks, a startup disk and a program disk; use the startup disk first.

startup drive: The disk drive from which you started your application.

stop bit: A binary digit (0 or 1) that indicates the end of a character in a string of serially transmitted bits. You can use the utilities to set up your serial ports to send the appropriate number for the device you're communicating with.

subdirectory: A file you create to serve as a folder for a number of related documents; it has its own list of these documents, a directory within the disk directory.

system file: A file that starts a whole application. When you want to start a ProDOS application after quitting the utilities, you provide the pathname leading to the application's system file. It's the one whose name ends in .SYSTEM.

transmission: Sending and receiving data. Some devices require data to be transmitted in serial fashion (one bit after another). With the Apple IIC and Apple IIC Plus, you can use the utilities to set the speed and format of data transmission to match the requirements of another device or computer.

unlock: To remove the restriction on a file so that it can once again be renamed, replaced, or removed. Compare **lock**.

utilities: Useful programs with which you can copy, delete, format, rename, and otherwise manipulate files and disks.

verify: To make sure that a disk can be read.

volume: A general term referring to an area in which you can store data. If you are using 3.5-inch disks or 5.25-inch disks, a volume is a formatted disk. If you are using a hard disk, its manufacturer may provide software to divide its storage area into several smaller areas, each known as a *volume*.

volume directory: With 3.5-inch disks and 5.25-inch disks, the main directory of a disk, containing the names, sizes, types, and locations of other files on the disk. Those files may be documents, application programs, or subdirectories.

volume name: The name of a formatted disk.

write: To transfer data from the computer to some destination outside the computer, such as a disk or a piece of paper in your printer.

write-enable notch: The square cutout on the side of the jacket of a 5.25-inch disk. When open, the notch allows the disk drive to write onto the disk.

write-protect: To protect the information on a disk from being changed or written over. You protect a 5.25-inch disk by covering the write-enable notch (the square cutout on one edge of the disk jacket) with an adhesive write-protect label, preventing the disk drive from writing new information onto the disk. You protect a 3.5-inch disk by sliding the write-protect tab to uncover the square opening on the disk.

XON/XOFF: ASCII characters that tell another device to turn on transmission of data, then to turn it off for a moment. A handshaking protocol you can set up in the utilities, to allow your Apple IIc or Apple IIc Plus to communicate with another device or computer.

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